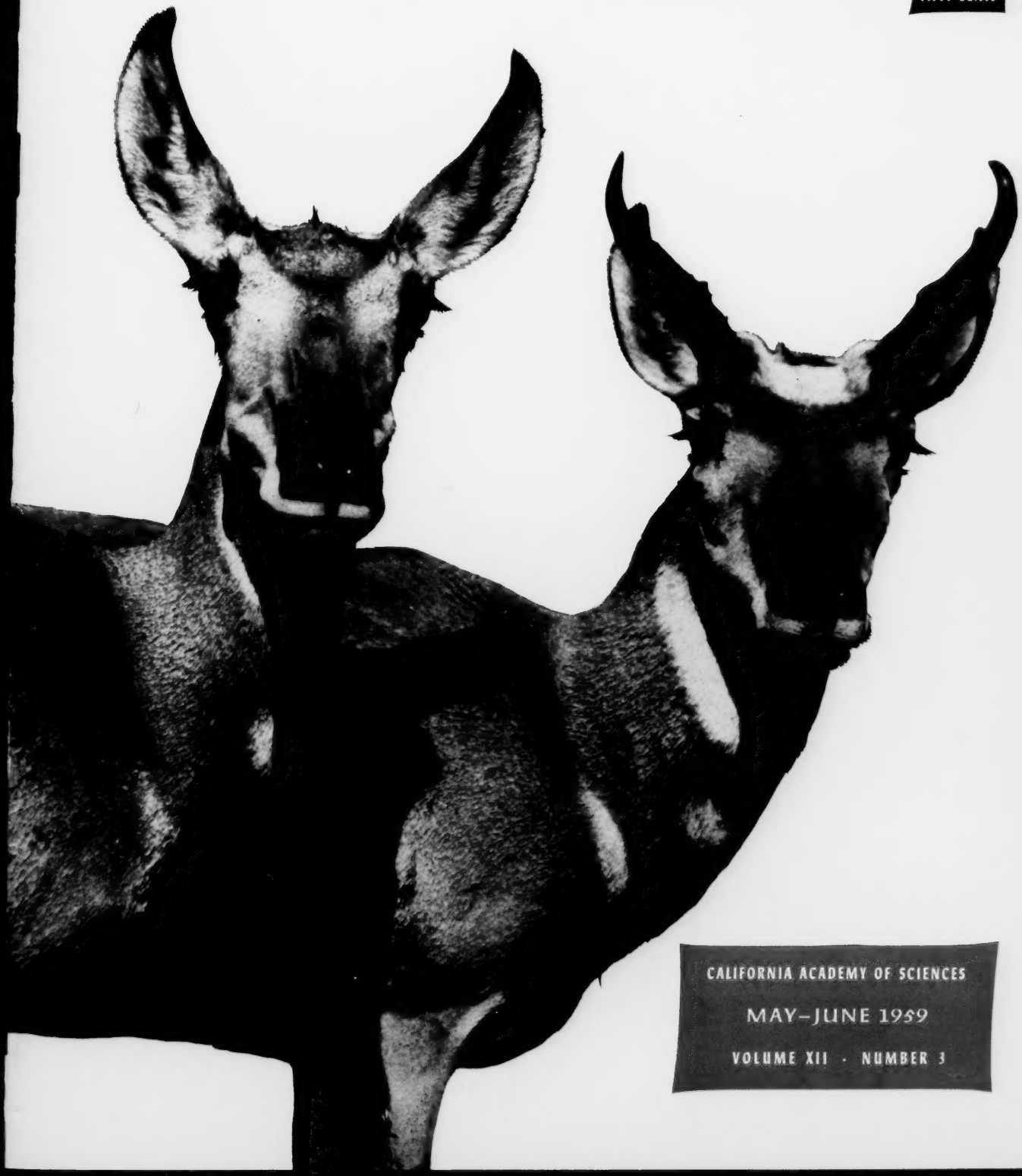
How fast is the Antelope?

PACIFIC DISCOVERY

FIFTY CENTS



CALIFORNIA ACADEMY OF SCIENCES

MAY–JUNE 1959

VOLUME XII · NUMBER 3

A JOURNAL OF NATURE AND MAN IN THE PACIFIC WORLD

MAY–JUNE 1959
VOLUME XII • NUMBER 3

PACIFIC DISCOVERY

Editor and Art Director: DON GREAME KELLEY; *Managing Editor:* ROBERT C. MILLER; *Associate Editor:* IRA L. WIGGINS *(Stanford University),* A. STARKER LEOPOLD *(University of California),* JOEL W. HEDGPETH *(College of the Pacific),* VERONICA J. SEXTON, BENJAMIN DRAPER, ROBERT T. ORR, ALLYN G. SMITH *(California Academy of Sciences);* *Special Correspondent:* THANE RINEY *(Southern Rhodesia); Advertising and Circulation Manager:* HAL RICHARDSON

PRE-DISCOVERY

AMERICANS have a lot to think about these days—weighty and momentous things. Summit meetings and satellites. Best buy in a small foreign car. Getting more scientist production out of the education mill. Getting the Yankees out of the cellar (or keeping them there). The surest exit from all our problems—lung cancer or fallout. . . . One matter of considerable national and world importance we ignore is an obligation we took on after World War II: the administration of the U.N. Trust Territory of the Pacific Islands. It may be that this matter isn't much on our minds because the shebang is operating quite well, thank you—no problem. No news, good news. Happily, this may be the case—even the Russians find little to criticize. But we shouldn't be smug. Surely we would all like to forget Bikini, and Eniwetok. But what about the Bikinians—only 167 of them, to be sure—and the 137 other Micronesians we moved away from Eniwetok? They are still around, somewhere—doubtless increasingly so. Are we doing our best to compensate them for the loss of their ancient, therefore best possible, homelands? Or do we shrug it off with "So what's the difference between one insignificant atoll and another?" Looking at Micronesia as a whole—what are our aims, and plans for carrying them out? Are they in the direction of bringing Micronesia more fully into the world economy and community, as an independent people? Are we educating and training Micronesians for leadership and managership in such a future nation? There is fortunately an excellent new book at hand which answers many of these questions for us. Few of us can go there, to that great scatter of small islands—2,141 of them comprising 687 square miles of land spread over 3,000,000 square miles of ocean and carrying 67,200 people. We cannot see for ourselves what we are doing for these Micronesians on an annual shoestring of seven million dollars. The Trust Territory administration, however, under High Commissioner Delmas H. Nucker, allowed Robert Trumbull, Chief of *The New York Times* Tokyo bureau to go in, roam around as freely as transportation would permit, interview anyone from Commissioner to coconut picker, and write the story for all the rest of us. The book is *Paradise in Trust: A Report on Americans in Micronesia, 1946–1958* (William Sloane Associates, New York, 1959; 222 pp., $3.50). Read it. You will learn that we have some fine people down there doing a good job. With more funds they'd do even better.

PD'S AUTHORS

COMBINING two interests, **Preston Butler** is a physicist in the U.S. Naval Radiological Defense Laboratory, San Francisco, and also a research associate in astronomy at the Academy. When not in one of these places or chasing eclipses in the South Pacific, Mr. Butler is at home in San Mateo. Formerly, he served the Smithsonian Astrophysical Observatory as astronomer, in Washington, and at the observatories, Montezuma in Chile and Table Mountain in southern California. . . . ¶ **Joseph L. Parkhurst, Jr.** of Colonia, New Jersey, collects old volumes on American history and gleans from them items to interest new readers. The edition of the work (see caption, p. 15) in which he found the Frémont portrait is not in either Sutro or Bancroft Library. Our author picked it up in a second-hand book shop. . . . ¶ **Henry H. Sheldon** of Portland, Oregon, is a veteran field naturalist and wildlife photographer appearing in our pages for the first time. . . . ¶ **Dorothy F. Lilly** (Mrs. Donald R.) made her hummingbird observations at her home in San Carlos, California, before moving to Los Angeles. She is active in the Sequoia Audubon Society, which sponsored publication of her checklist of "Common Birds of Garden, Park, Forest and Chaparral of the San Francisco Bay Region" (1958). The photographs by the junior author, **Dr. Robert T. Orr,** Academy curator of birds and mammals, were taken from the department window when he was located in North American Hall. D.G.K.

IN THIS ISSUE

EDITORIAL: *Move Over, Piltdown—Here Comes Kensington!* 1

"Have a Coconut!" PRESTON BUTLER 2

The Search for the Buenaventura JOSEPH L. PARKHURST, JR. 14

SCIENCE LOOKS INTO IT

The Prong-horned Antelope—How Many Miles an Hour? HENRY H. SHELDON 18

The Allen Hummingbird—How Many Nests a Year? DOROTHY F. LILLY & ROBERT T. ORR 22

ASTRONOMY: *The IGY and Earth's Radiation Rings* GEORGE W. BUNTON 26

REVIEWS 29

FROM THE READER 33

Academically Speaking 33

THE COVER

PRONGHORN doe and buck on the alert, but not averse to have Mr. Henry H. Sheldon, naturalist and photographer of Portland, Oregon, shoot their portrait. (*See page 18.*)

Pacific Discovery is published bimonthly at Gillick Press by the California Academy of Sciences. Publication office: 2057 Center Street, Berkeley 4. Editorial, Advertising and Circulation offices: Golden Gate Park, San Francisco 18. Annual subscriptions: U.S., $3; Foreign, $3.50. Single copies, 50c. Members of the Academy subscribe through their dues. Entered as second-class matter, February 17, 1948, at the Post Office, Berkeley 4, California, under the act of August 24, 1912.

Copyright 1959 by California Academy of Sciences

EDITORIAL

MOVE OVER, PILTDOWN—HERE COMES KENSINGTON!

8 SWEDES and 22 Norwegians on an exploration journey from Vinland westward. We had our camp by 2 rocky islets one day's journey north of this stone. We were out fishing one day. When we came home we found 10 men red with blood and dead. AVM save us from evil. We have 10 men by the sea to look after our ships, 14 days' journey from this island. Year 1362.

The 30x16x5-inch graywacke slab bearing this piece of spot news, which turned up on Olaf Ohman's farm near Kensington, Minnesota in August, 1898, has been laid to rest in its rightful place beside the Cardiff Giant and the Piltdown Man. That is quite probably where it belongs, and we may call a fifty-year-old game of scholarly wit-matching now that the UCLA professor of Scandinavian languages, Erik Wahlgren, has had his innings.

It has been an exciting and seesaw game, this pennant race to establish the runic Kensington rock once and for all as the earliest known native document of European man in America. Chief hurler for the Kensingtons has been Mr. Hjalmar R. Holand—he has gone the distance. Mr. Holand has also been manager and —owner. In the latter role he has tried to sell his interest for as much as $6,000. It goes without saying a winning club is easier to sell than a losing one.

The present bit is properly neither editorial nor review of Erik Wahlgren's book *The Kensington Stone, a Mystery Solved* (Madison, Wisconsin, 1958). It is more in the way of a postscript to some earlier remarks of ours. In *PD* for May-June 1956 we referred to the Kensington Stone as "one of history's great enigmas, . . . now in the Smithsonian, 'cleared' by various specialists as genuine," and we briefly discussed certain authors pro and con. By the next issue we had received Holand's latest book, *Explorations in America Before Columbus*, and said this in Pre-Discovery (July-August, 1956): "More than any other, Hjalmar R. Holand may be credited with bringing the controversial Kensington Stone into the arena of scholarship where specialists in every pertinent field have for nearly fifty years stubbed their toes and bruised their shins on it, until it has at last been accepted by the Smithsonian as a document of American history." Referring to Mr. Holand as "himself a scholar in Scandinavian-American history," we stuck our neck out still farther with this gem: "Chances are you will agree, when Mr. Holand rests his case [for explorations in America before Columbus, particularly for the putative royal Norwegian expedition of 1355], that it is squarely up to counsel for opposing schools of thought to prove that no such nine-year expedition (1364 is the year postulated for the homecoming of its survivors) ever took place, on top of continuing to hold in the face of competent authority that the inscription found near Kensington, Minnesota, is after all a preposterous fraud."

Well, now, summing up for the prosecution, Counsel Wahlgren has made his final address to the jury, asking for a verdict—not of fraud, which has ugly implications, but of *hoax* (which rhymes with jokes). He wants to make it clear, however, that his search for the truth, which he believes should lead the jury of disinterested opinion to find against the purported antiquity of the stone, has "not been motivated by the urge to single out a perpetrator as such. . . . We assert as solemn opinion," he declares, "that the planting of such a mock runic monument—by a lay person and under such circumstances—was *not in any sense a dishonorable act* [but] a clever and understandable hoax with both amusing and tragic consequences, and the Kensington story is an episode in the history of the development of the American frontier. . . . We cannot better conclude this volume than by quoting once more the title of George T. Flom's article of many years ago. It reads: 'The Kensington Rune Stone: A Modern Inscription from Douglas County, Minnesota'."

A necessary P.S. to this postscript is to assure present readers that nothing here or in Professor Wahlgren's book is meant to imply that the unfortunate Mr. Holand himself perpetrated the runic hoax. It seems likely that both the inscription and Holand's championing of it wear the color of an attempt to put the Norsemen one up in the American discoveries sweepstakes. This plus the hue of the hope of economic reward tinged Mr. Holand's scholarship to the point of non-objectivity, let us say. His is perhaps the ultimate tragedy in consequence of an initially harmless spoof—whose, may never be, or need to be, known.

D.G.K.

The Kensington Stone: *A Mystery Solved.* By Erik Wahlgren. The University of Wisconsin Press, Madison. 1958. xiv + 228 pp., 30 figs. in halftone and line. $5.00.

Transcription of the Kensington runes—a modern attempt to recreate Old Swedish? (From endpapers of *The Kensington Stone: A Mystery Solved*, by Erik Wahlgren, reproduced by courtesy of The University of Wisconsin Press, Madison)

PRESTON BUTLER

THREE MEMBERS of the California Academy of Sciences attached to the IGY Eclipse Expedition lived for several weeks on the island of Motu Kotawa, one of the Danger Islands. While making preparations for the eclipse, we made frequent visits to the island of Pukapuka, three miles across the lagoon. We visited their new school while it was in session, heard the children sing, and watched them dance. We went to dances on Friday nights, went to church on Sunday, and ate dinner in the homes of our new-found friends. The hospitality they showed the Americans was in the true western style.

Since the atoll has no anchorage and lies off the regular tourist routes, it remains one of the most isolated in the Pacific. It was untouched by our armed forces during World War II. The copra ship, *Marie McDonald,* from Rarotonga, comes at infrequent intervals even now, so the people must supply almost all the necessities of life from the islands themselves. There are few natural resources, no marketable pearls in the lagoon, no minerals, no commercially valuable wood, and no means of preparing fish for export. The sole source of revenue is copra, about a hundred tons a year from the three islands making up the atoll. At the

Green coconuts on Jaluit, Marshall Islands. (Don Ollis)

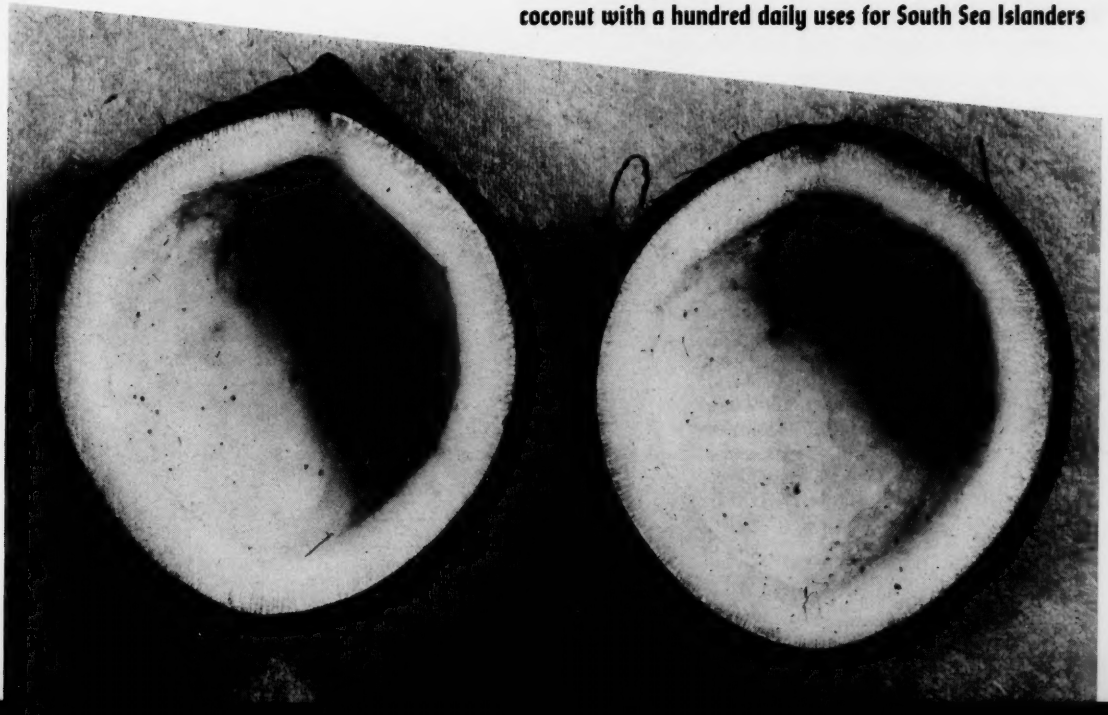
current market price, the sale of this copra nets each man an annual income of around $15 U.S. currency.

When the ship comes in, the local store will stock such items as bolts of cloth, thread, matches, tobacco, benzine, fish line, hooks, salt, and sundry tinned goods. Medicine, school supplies, mail, and stamps are handled by the Cook Island Medical Practitioner, the School Master, and the Resident Agent, all Polynesians native to the Cook Islands. These men are paid salaries by the Island Territories Administration under the New Zealand Government. After the purchase of a few items following the arrival of the ship, the natives have very little money left to buy food, even if it were for sale. For this reason, the economy and a large part of the culture of the people depends on the utilization of the coconut palm, both for income and for subsistence.

The coconut palm *(Cocos nucifera)* will grow on a coral atoll where the depth of soil is only a few inches. It will reseed itself when left alone, but will flourish when planted three feet deep and tended. It will travel by itself from island to island when nuts are blown into the sea during high winds and carried to some distant atoll by the ocean currents. There are islets in the Pacific no more than 50 feet across which support a single healthy palm. It is relatively free from disease, never needs to be pruned, sprayed, or fertilized. It matures in seven or eight years, when it reaches a height of 60 to 100 feet. It produces fruit all year, bearing simultaneously buds, flowers, the green drinking nuts, and the mature ripe ones. One tree will yield about 100 nuts a year, sufficient to make 50 pounds of copra. Besides its fruit, the Polynesians have found hundreds of uses for its wood, leaves, and fiber. It has often been said that the coconut palm will supply a man with everything he needs from the cradle to the grave. This "everything necessary" refers to a way of life unknown to us, but which has nevertheless

a Coconut!"

. . . This is how members of the Academy eclipse team were greeted as they stepped ashore on Pukapuka. Instead of a cocktail or a cup of coffee, a guest on a Pacific island is offered a freshly opened, cool, green drinking nut to sip while chatting beneath the shade of the graceful palms—the versatile coconut with a hundred daily uses for South Sea Islanders



Ripened coconut with the meat at full thickness. Such nuts are dried in the sun to make copra. The author opened this one on a meridian instead of on the equator in the native manner. (C.A.S.)

flourished for centuries and in a few places in the Pacific continues today.

Drinking them

There are no springs nor streams on the small coral islands of the Pacific, so the problem of fresh water is acute. Formerly, wells were dug, but the rain water collected in them becomes brackish and contaminated. The Island Territories have erected water tanks filled from aluminum catch roofs, the one on Pukapuka holding 100,000 gallons. Since many other islands have no such provision, the people continue to drink from the green nuts, because of both custom and taste.

The best water is that found in a full-grown green nut, taken directly from the tree. It is pure, tart, and said to be "cool"; however, we measured the temperature of the water in one of these nuts and found that it was the same as the ambient air temperature. It is perhaps better to say that the drink is not warm. These nuts contain about a pint of liquid, and it is reported that a man can drink the contents of four of these a day without any pronounced laxative effect.

As every combatant in the Pacific theater of war was told, the water in a coconut can be safely drunk as long as it can be heard to slosh. Even those which have fallen to the ground and are dry and brown on the outside may be good. The water

↑ The "milk" from a green coconut is very refreshing ➔ and so, in the view of many islanders, is the juice of a coconut palm bud after due processing: the bud is cut off near the tip and bent down so that the juice will drip into a bottle, a string of sennit (coconut fiber) holding it in place. In a couple of days the fluid turns into a sort of champagne; a few more days and it becomes quite potent. This "still" is in the Marshalls.

➔ (OPPOSITE PAGE) A Palmyra Islander demonstrates the traditional and therefore proper approach to drinking in coconut country, where the first step is to obtain a green nut. The dense Palmyra jungle has resulted from wild tree growth under favorable conditions. (Photos by Don Ollis)

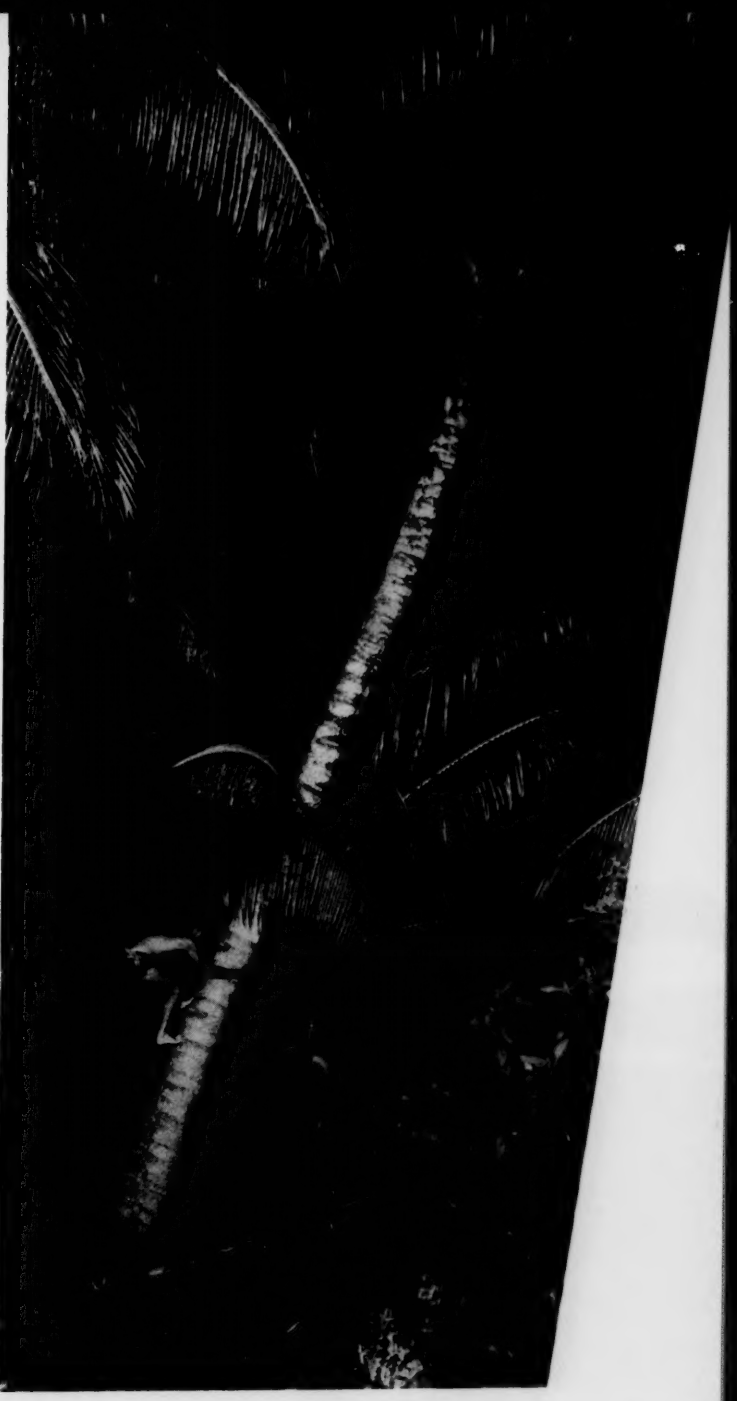
in a mature nut which has not been split will keep fresh for as long as eight months while floating in the ocean.

The green nuts are slick and hard, and at first glance it appears a formidable task to husk one, but we saw a youngster no more than seven years old go after a green nut, husk and open it with no tools whatever. He grasped the nut firmly with both hands, and with elaborate grimaces worked his teeth into one end and with a lot of twisting and pulling peeled down a small segment. After spitting out the fine fibers, he repeated this process until he had a cleaned section about two inches down one side. He then laid the nut on the sand, carefully worked it down until it was firm, crooked his arm, and with one quick jab with the point of his elbow cracked a small hole in the side. After digging out the larger pieces, he tipped it up and drank the contents. A good deal ran down his chin but — small matter when one is thirsty.

Adults carefully crack the nut around the top with a sharp piece of coral, opening a hole about two inches wide from which a man can easily drink without dribbling. At the table, the opened nut is placed in a tin can to hold it vertically.

There is no sharp distinction between the water and the milk; it is always said that babies are fed the *milk*, even though it may be from a green nut. Babies are fed the milk directly after weaning, and many children whose mothers could not nurse them are fed on the milk from birth. It is hard to imagine a better source of milk under the circumstances than this. One has only to climb a nearby tree, knock down a green nut, open, and pour directly into a nursing bottle. It is already at the right temperature, is sterile, and costs nothing but the effort. As a child grows older, additions of the cream squeezed from the grated meat of mature nuts add to the nutritive value.

One of the strangest uses of the coconut milk was attested to us by the Medical Practitioner. According to his account, a woman who had hemorrhaged following parturition was saved by giving her intravenously the entire contents of a green drinking nut. Actually the procedure was quite simple: the needle was inserted into the vein and connected to a rubber tube, the other end pushed into the eye of the nut. By simply holding the nut up, the liquid drained directly into the woman's vein. In a place where blood banks are not available, this is certainly a novel and valuable use of the coconut.



Coconut cream is made by squeezing grated meat from mature nuts through the strands of a green husk or through a piece of cloth. If it is too thick, it may be diluted with a little milk. This is an excellent substitute for cow's cream in coffee. It will sour in a few hours when a little sea water is added, making a fine sauce. Pieces of grilled fly-

Sturdy baskets can be made of palm fronds "on the spot" whenever a tree is handy. (British Samoa; Don Ollis)

ing fish dipped in this sauce and eaten with the fingers is a delicacy by any standards.

Eating them

Coconut meat has always been the basic food of the Pukapukans. Unlike fish, taro, chicken, and pork, which are not plentiful enough to eat every day, the coconut is eaten daily in some form. Aptly called the perfect food, it can be eaten raw in almost every stage of development as well as cooked in many ways. The meat from at least ten nuts a day is required to keep an active man healthy, but this seemed to us an excessive amount. Children, of course, required less although they wasted a good deal. We saw children open a drinking nut, drink the contents, break off a small piece of meat, and throw the rest away. While at school during recess, you see children chewing a small piece of the meat. At our movies, which were the first the natives had ever seen, both men and women brought pieces of the nut and would sit and chew during the show. When hunger calls, no matter what the time of day, or the place, there is always a meal ready at hand.

A white crispy meat called *uto* is obtained from the germinated heart of the coconut. Nuts which have been lying on the ground and which have sprouted are carried out from the shade and exposed to the direct rays of the sun to sear the sprout and rootlet. Generally forty or fifty of these

Three
the yo
an Am
(U.S.

Copra is the basis of his economy. (Ollis)

nuts are buried in the sand for a period of three to six weeks, during which time the germinating process continues, consuming all the milk and meat in the shell, and leaving the shell filled with uto. It has a delicate flavor, but to us it leaves a slightly soapy taste in the mouth. It is considered a great treat and is eaten either raw or baked in the shell when it resembles buttered squash. As a flavoring it adds much to such dishes as the tasteless boiled taro.

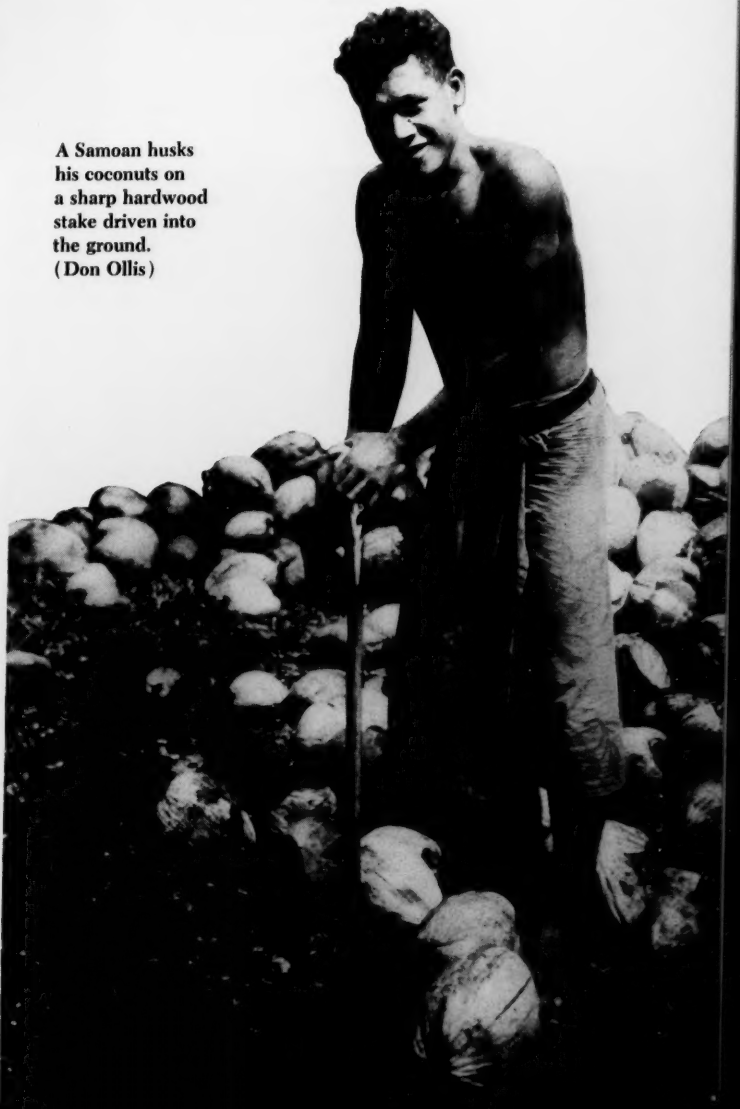
No method of preserving either the milk or the meat for eating is practiced since the tree bears all year. Rainfall varies widely and there are periods of several weeks durinng the dry season when no rain falls; but even during these times, the palms bear fresh green drinking nuts. No Pukapukan has to plan a year ahead as our American Indians had to do, so that the very idea of preserving food against a period of famine has never occurred to him. Neither refrigerators nor cupboards are necessary, for tomorrow's breakfast will keep better on the tree.

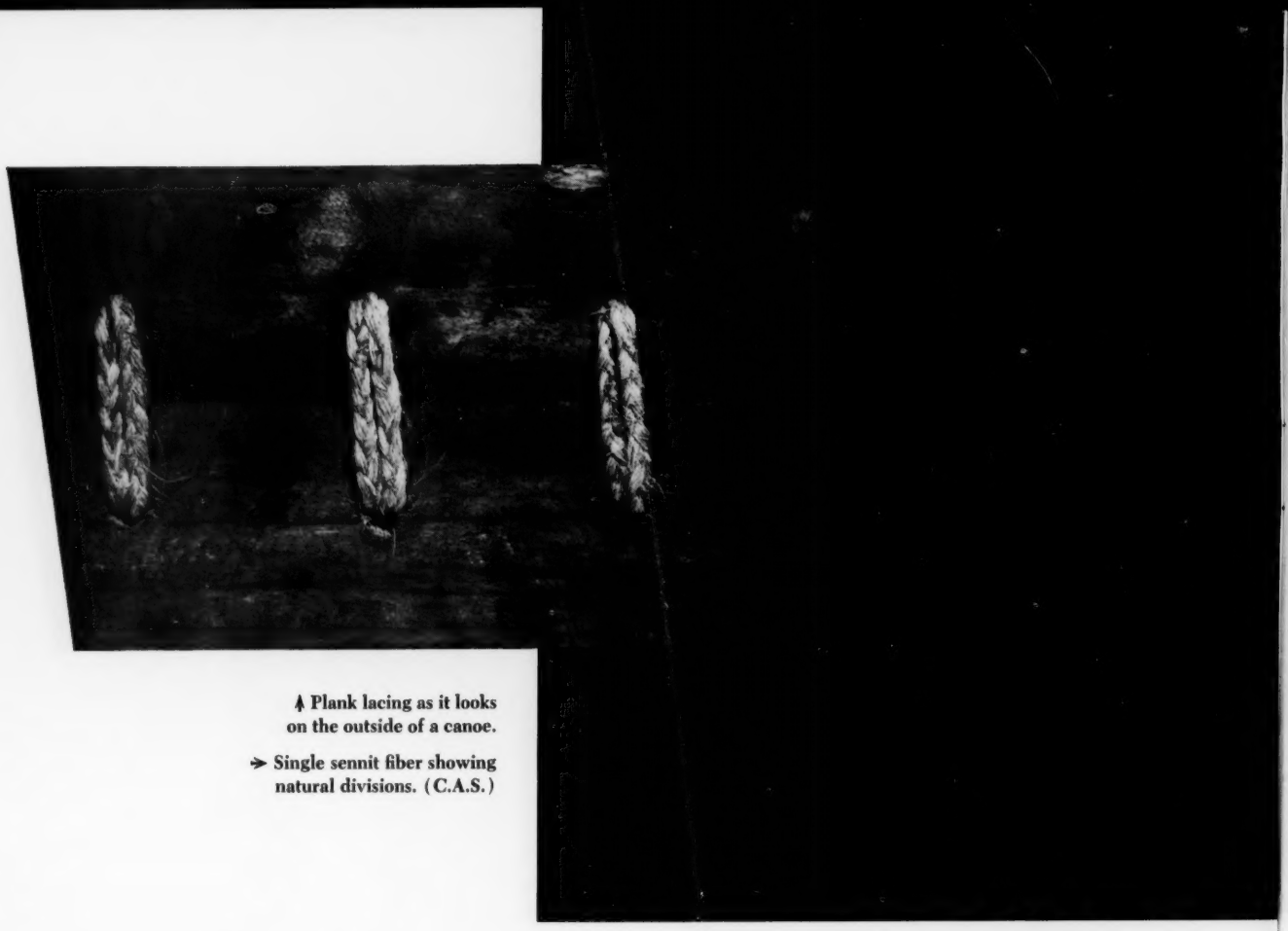
Three Pukapuka generations at home, the youngest nibbling coconut just like an American child with a lollipop. (U.S. Naval Research Laboratory)

Copra is simply dried coconut meat. The mature nuts which fall to the ground are gathered together, husked, and carried to the beach in palm leaf baskets. There they are opened by striking with a sharp piece of coral. One curious feature of the mature nut is that its natural fracture plane lies around the middle, about halfway between the eye and the pointed end. A nut opened by striking with a hammer around the middle looks almost as if it had been sawed across. After opening, the nuts are placed on drying racks made from palm midribs laid on poles with the meat facing upward to dry in the sun. When dried, the meat separates naturally from the shell, after which it is hauled to the copra storage sheds until the arrival of the ship.

Pigs were introduced into the islands many years ago, and while they are small by our standards, they do provide a change of diet, especially for celebrations. Each animal is tied by a piece of sennit to the base of a palm and is fed and watered

A Samoan husks his coconuts on a sharp hardwood stake driven into the ground. (Don Ollis)





↑ Plank lacing as it looks on the outside of a canoe.

→ Single sennit fiber showing natural divisions. (C.A.S.)

from a small wooden trough. At feeding time, the owner takes a mature nut, opens it with a machete, and in a few minutes pries out the meat in little pieces into the trough. With the exception of taro peelings and a few leftovers, coconut meat is also the main food for the pigs. It is perhaps a good thing that they do not grow to more than about 80 pounds since they are carried in the canoes from island to island, and even the larger canoes are just about wide enough to accommodate an animal.

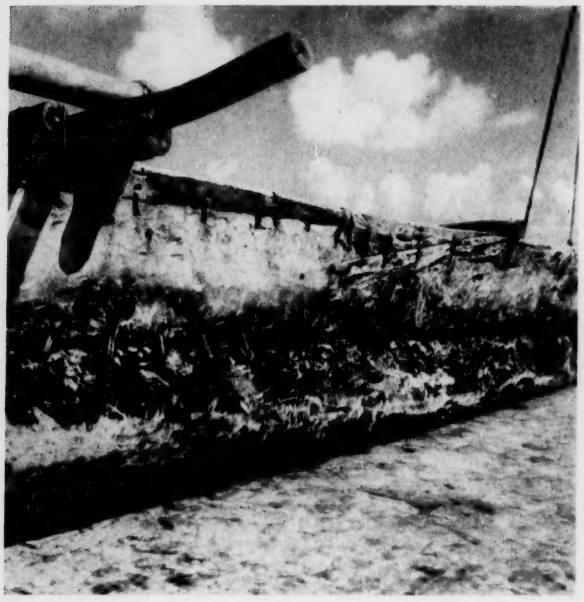
Tying things up

The most common rope which is seen everywhere is fabricated by hand from the fibers of the coconut husk. It is called "sennit," an English word, but accented on the last syllable as though it were spelled "seneet."

After the nuts have been husked for the copra making, the husks are neatly laid in large piles beside the forest trails. Those selected for sennit are buried in the sand for a period of two to three months when most of the interfibrous material will have decayed. They are then dug out of the sand, pounded to loosen the fibers, washed in salt water, and laid out in the sun to dry and bleach. Following this treatment, the fibers are roughly segregated for size, and worked with the hands to make them a little more pliant. During growth, the fibers divide like roots and a single one may be eight to twelve inches long. When ready to make into sennit, one of these fibers may have several divisions of varying thicknesses and terminate on both ends with a dozen fine threads.

To make the sennit, a few fibers are selected, rolled between the hands until they are intertwined, a few more added until a single strand has been twisted together. If a three-ply cord is to be made, three of these strands are tied to a stake and, held taut, are woven together with an overhand braid. Such a line is oval in cross section, measuring about one-quarter inch wide by about one-eighth inch thick, and is ideal for lashing since it lies flat against a beam or board.

Canoes are made from hollowed sections of large logs, four to six feet long, each individual piece resembling a large U. They are cut square

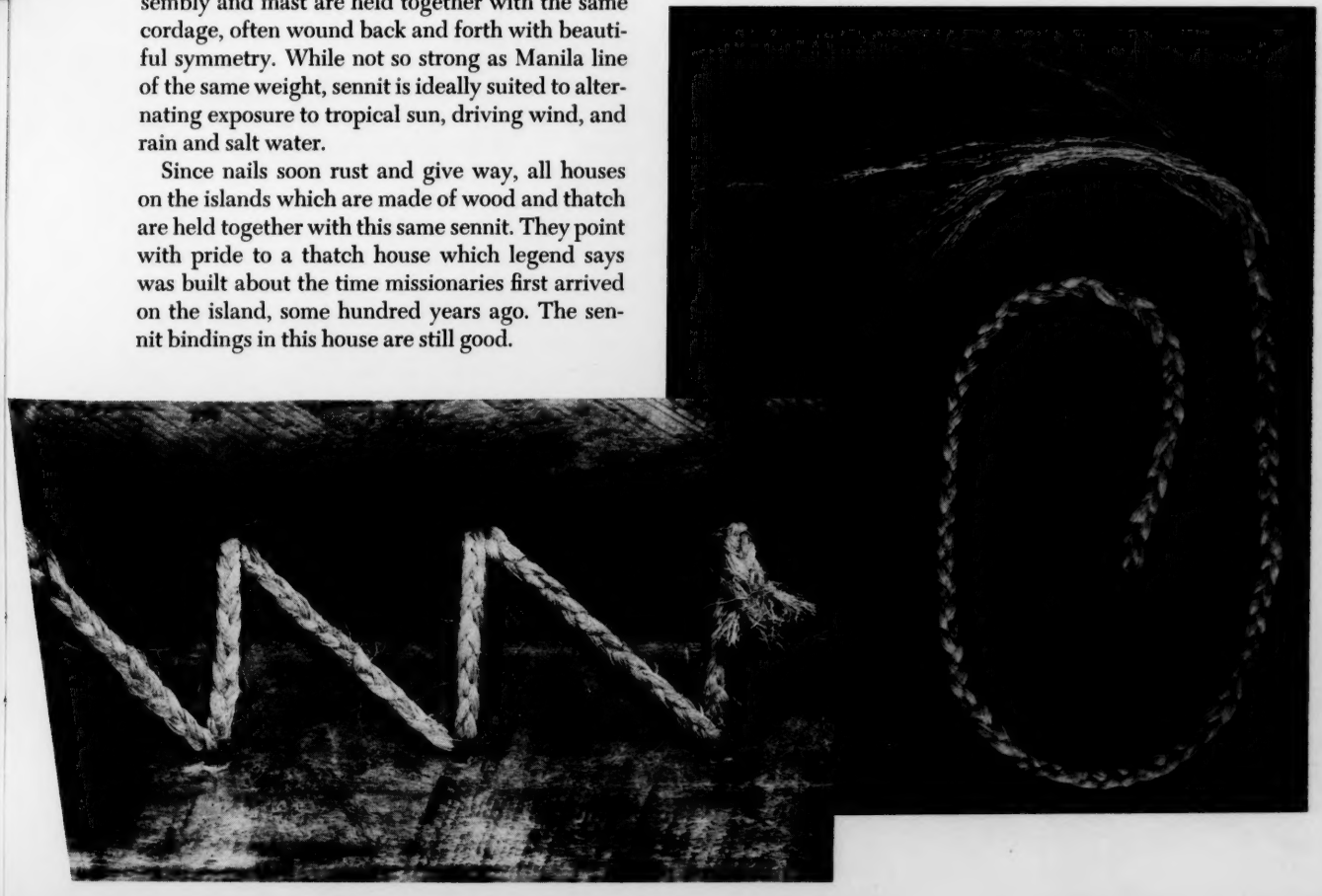


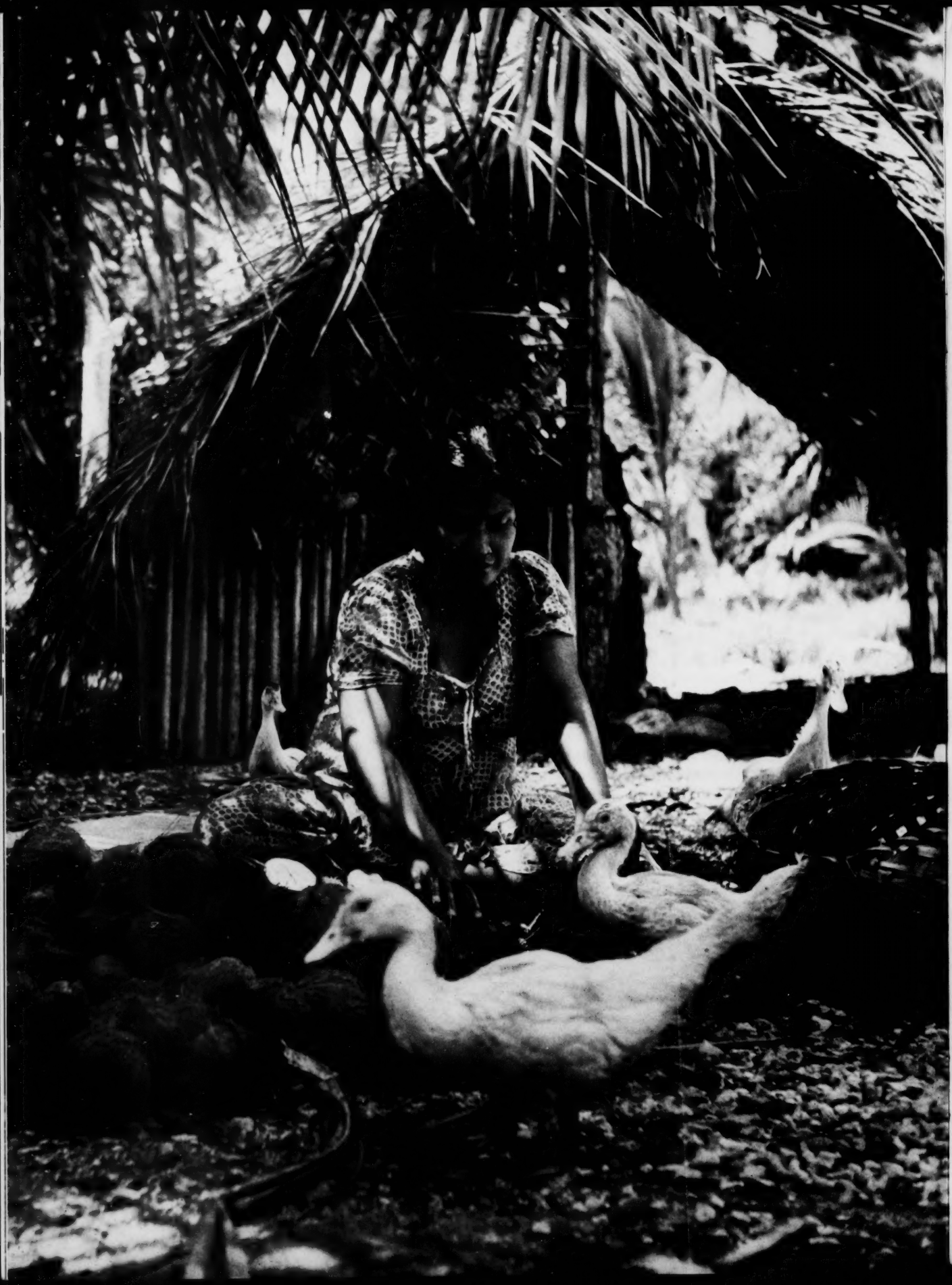
on the ends and butted with no mortise or tenon joint but with matching holes drilled through each section. Sennit cord is passed through these holes and laced from one hole to the next. Three or four such sections make up the hull of the canoe. A washstrake, usually a single piece running the entire length of the canoe, is likewise bored and lashed to the hull sections. Both the outrigger assembly and mast are held together with the same cordage, often wound back and forth with beautiful symmetry. While not so strong as Manila line of the same weight, sennit is ideally suited to alternating exposure to tropical sun, driving wind, and rain and salt water.

Since nails soon rust and give way, all houses on the islands which are made of wood and thatch are held together with this same sennit. They point with pride to a thatch house which legend says was built about the time missionaries first arrived on the island, some hundred years ago. The sennit bindings in this house are still good.

▲ (LEFT) Side of a canoe of laced planks. (RIGHT) Outriggers are lashed and rigging is made of braided sennit. (G. W. Bunton)

▼ (LEFT) Canoe plank lacing, inboard view. (RIGHT) Braided sennit cordage. (C.A.S.)





An ancient chant quoted by Buck[3] stresses the importance of the sennit lashings:

> This sennit of thine, O Tane,
> Make it hold, make it hold.
> It cannot weaken,
> It cannot loosen,
> When bound with sacred sennit,
> With thy sacred sennit, O Tane.

Roofing

Roofing sheets are made by splitting the midrib of a coconut frond and weaving the two sections together. One of these sheets measures about six feet long and three feet wide. When laid from the bottom up, as we lay shingles, such a roof is leakproof for a long time. Two of the natives made such a roof for us, and during the time we occupied our hut it did not leak. We were in a hurry (they wondered why the Americans were always in this state) so we attached the sheets with nails, which were already badly rusted by the time we left. The proper way to make a roof is to lash the sheets to the framework with sennit.

Heat and Light

All cooking is done over fires made with empty shells left from the copra operations. They burn well, forming a glowing bed of coals much like that from the hardwood charcoal we use in a barbecue. Each household has two thatched houses, one for sleeping, the other for cooking. The cooking houses are quite small, open on three sides, with a pit sunk in the middle and lined with slabs of coral limestone. A flat sheet of iron over the top provides a stove top for cooking in pots, and an open space below serves as an oven. No flues or chimneys are needed, since there is little smoke and the open construction allows plenty of ventilation. The food is prepared for cooking in the open in front of these houses.

Our first meal with our friends was memorable. We were seated on chairs around a table covered with a white cloth under the shade of a thatched porch. This was a special occasion, for ordinarily the family sits on the ground with the food spread out before them on fresh palm fronds. One plate and a green drinking nut was set at each place. In the center of the table were two plates, one holding a hot roast chicken and the other filled with cold boiled taro, the color of navy gray paint. There were no utensils.

We had quite an audience—numerous small fry squatting on the ground, several teenagers, two elders and the women, most of whom stood as we ate. A girl behind each one of us kept the flies off our plates with a coconut frond fan. It was a little difficult to begin, for none of us was familiar with the proper technique for handling a hot roast chicken with bare hands. At the urging of our hosts to begin, one of us grasped the greasy fowl in both hands and with some effort pulled off a drumstick, then a wing, and by digging with fingers separated a good-sized piece of white meat and passed them

Layers of coconut fronds will form a watertight roof on this Samoan *fale* (house). (Ollis)

← (OPPOSITE PAGE) Coconut economy: building materials, food, cordage, baskets, shade, and copra for cash; even the ducks get theirs—shredded coconut meat. (Marshall Islands; Don Ollis)

A street in the temporary village of Yato adjoining our eclipse camp—palm-thatched roofs and *poro* mats for siding evident everywhere. The little girl runs across broken coral on feet so calloused she doesn't feel it. (U.S. Naval Research Laboratory)

around. It was easier to eat the taro, and of course we were used to drinking from the nuts, so the meal was finished without dripping on the table cloth. While we missed salt and condiments, it was a very satisfying meal. Our hosts had thoughtfully provided a pan of fresh water, soap, and a towel to wash and dry our hands when we finished.

Light is provided by candles made by threading pieces of copra on a spike and lighting the top piece. After burning a short time the oil collects and will burn steadily with a faintly fragrant odor, giving a soft light.

Torch fishing at night is still practiced regularly. It is a sight well worth watching to see six or eight canoes out in the water, each with a huge torch which blazes high for a few minutes and then dies out, then a little later another will light up and die out. These torches are made from the midrib of the coconut frond. The ends are frayed and tied together to make a compact bundle of dry inflammable material which will burn brightly for several minutes. They sometimes add a little benzine to make it easier to start. The torches are held by one man high overhead, while another man holds a net outboard to catch the flying fish which swim toward the light. We saw one or two gasoline lanterns used for this purpose, but they are expensive and are probably no more efficient than the flaming coconut fronds.

Long ago, some one with enquiring mind and observing eye noticed that the heat from his fire of coconut shells would turn part of a coral slab into a powder. If this powder was then mixed with sand and water to form a paste, and allowed to dry in the air, it would become hard and would fasten two pieces of coral together. The man who made this discovery probably soon realized that permanent walls for a house could be made with square blocks held together with this cement. It seems fairly certain this idea started after the coming of the missionaries and may have been introduced to the islands by Europeans who recognized that the entire atoll is made of limestone, the end product of the billions of coral polyps whose dead skeletons have solidified to form the great reefs.

The lime pit on Pukapuka is about fifteen feet square and four feet deep. Logs, coconut shells, dried fronds for starting are laid on the bottom and on top of these are laid pieces of coral. The logs are ignited, and after burning out and cooling a good supply of quick lime is at hand. This is then mixed with sand and water to make a mortar, with

British Samoa. (Don Ollis)

which they cement coral blocks to form fine, smooth floors and walls. The entire process can be written in two ways, one in the language of the chemist and the other for the layman:

1. $CaCO_3 + Heat \rightarrow CaO + CO_2$
2. $CaO + H_2O \rightarrow Ca(OH)_2$
3. $Ca(OH)_2 \rightarrow CaCO_3 + H_2O$

or

1. Coral plus heat makes quick lime.
2. Quick lime plus water makes slaked lime.
3. Slacked lime plus coral sand makes wet mortar.
4. Wet mortar plus air makes mortar cement.

Most of the permanent homes are made of coral slab construction with thatch roofs and from the outside they resemble our adobe structures. The largest building on the island, the London Missionary Society Church, is made of coral slabs and is an excellent example of a relatively modern building made from local materials.

This account has omitted a good many uses of the coconut palm such as the oil for cooking and for rubbing on the skin, the uses of the empty shells for shovels, cups, trinkets, and ornaments. No mention has been made of the beautiful mats, hats, handbags, fans and belts which the women make from the long palm leaves. All Cook Islanders wear European clothing now, but before the coming of the missionaries, they made their clothing from the fine mesh bark which grows around the base of young trees. Another full story could be written of the uses of copra after it leaves the islands in the manufacture of soap, oils, and margarine, and of the husk fibers for brushes and mats.

A coconut culture such as that of Pukapuka is restricted from our point of view. To be sure they have no literature, very little art, and none of the technology which is characteristic of the west; however, they are a happy people, they laugh and sing and dance, they go to church on Sunday, and they work and play and love. The island's future is bright with a new school, better medical and dental attention, and an attempt to plant pearl-bearing shells in the lagoon. The Pukapukan way of life is not like ours, but there is a degree of contentment among all these people which we perhaps never know.

References to the use of the coconut are widespread in literature, especially in descriptive material of the Pacific. The following are readily available:

(1) *The Book of Pukapuka*, Robert Dean Frisbie, The Century Company, 1929.

(2) *Ethnology of Pukapuka*, Ernest and Pearl Beaglehole, Bernice P. Bishop Museum Publication No. 150, 1938.

(3) *Vikings of the Sunrise*, Peter H. Buck, J. B. Lippincott Company, Philadelphia, 1938.

(4) *South Sea Lore*, Kenneth P. Emory, Bernice P. Bishop Museum Publication No. 36, Honolulu, 1943.

(5) "The Coconut Palm and Its Uses in Oceania," F. D. McCarthy, The Australian Museum Magazine, Sydney, Vol. 8, No. 7, 1944.

(6) *The Island of Desire*, Robert Dean Frisbie, Doubleday Doran Company, New York, 1944.

(7) "Food Is Where You Find It," Cranwell, Green and Powell, Auckland Institute and Museum, Auckland, N.Z., 1944.

(8) *Coral Island*, Marston Bates and Donald P. Abbott, Charles Scribner's Sons, New York, 1958. (See Reviews.)

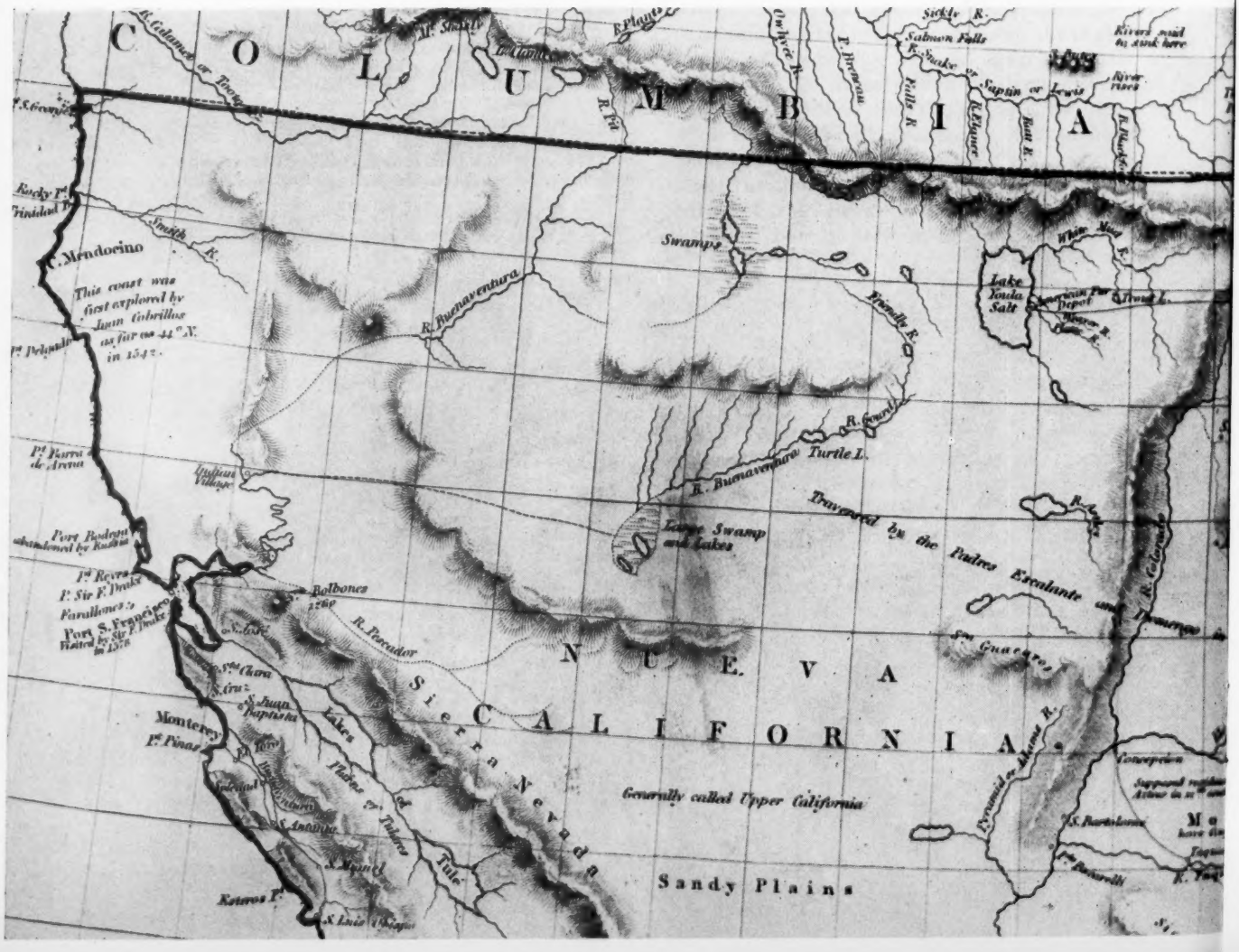
THE SEARCH FOR *The Buenaventura*

JOSEPH L. PARKHURST, JR.

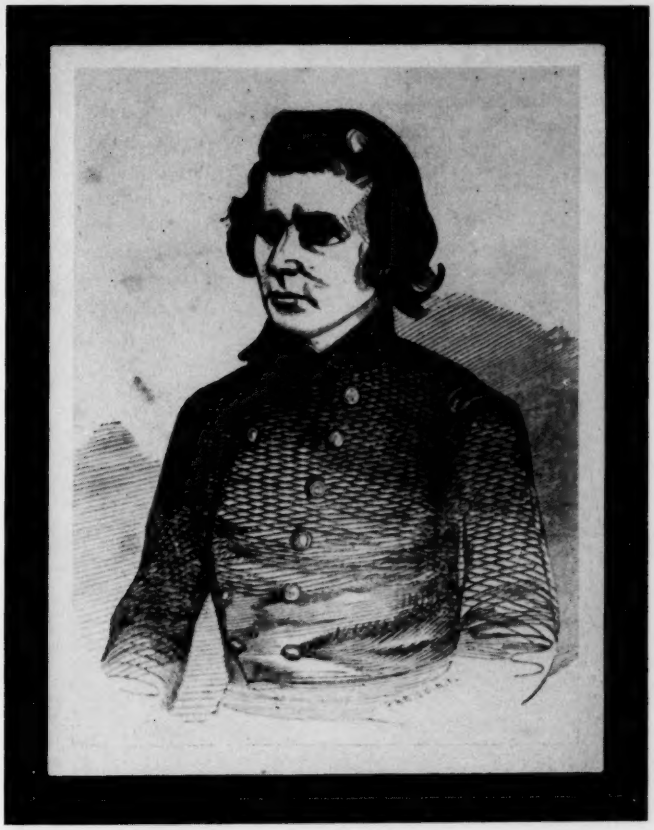
ONE OF THE MOST persistent beliefs among early travelers in the West was that a connected water line flowed from the Rocky Mountains to the bay of San Francisco. A number of maps indicated such a grand river, called the Buenaventura, opening far into the interior of the continent. It was mentioned several times in the narrative of John C. Frémont's expedition to Oregon and North California.

Frémont considered the Buenaventura one of the main objectives on his return route from the Columbia River. After reaching Klamath Lake he planned an exploring trip into the Great Basin to search for it. "This was our projected line of return—a great part of it absolutely new to geographical, botanical, and geological science—and the subject of reports in relation to lakes, rivers, deserts, and savages hardly above the condition of mere wild animals, which inflamed desire to know what this terra incognita really contained."

Going south along the eastern slope of the Sierra Nevada, the exploring party shivered through the winter of 1843-44 hoping to find this fabulous watercourse. They had anxiously looked forward to a southern exposure in the Buenaventura valley and shelter



There were many who looked for the mysterious river, but it took a Frémont to find the truth about it . . .



"J. C. FREMONT, Lieut. Col. Mounted Lifles" [sic]—the caption appears thus in the present author's copy of History of the War Between the United States and Mexico *by John S. Jenkins (Derby, Miller & Co., Auburn, N.Y., 1849). Frémont is rarely beardless in his portraits.*

from wind and snow. What they found instead was a forbidding desert stretching eastward from the mountains, divided into many shallow reservoirs, or sinks, where the residue of little streams evaporated.

This voyage into the unknown desert carried with it, of course, the anticipation of new discoveries. One place of geographic interest was a lake close to the mountains, complete with salt spray and waves, and featuring a huge pyramid-like rock. It reminded Frémont of the Great Salt Lake and the legends of whirlpools and subterranean outlets. "Beyond, a defile between the mountains descended rapidly about two thousand feet; and, filling up all the lower space, was a sheet of green water, some twenty miles broad. It broke upon our eyes like the ocean. The neighboring peaks rose high above us, and we ascended one of them to obtain a better view. The waves were curling in the breeze, and their dark-green color showed it to be a body of deep water. For a long time we sat enjoying the view, for we had become fatigued with mountains, and the free expanse of moving waves was very grateful."

Acting as guide to the expedition, Kit Carson was an invaluable aide to Captain Frémont. "With every stream I now expected to see the great Buenaventura; and Carson hurried eagerly to search, on every one we reached, for beaver cuttings, which he always maintained we should find only on waters that ran to the Pacific; and the absence of such signs was to him a sure indication that the water had no outlet from the great basin."

The exploring party spent a hard winter trying to find a pass through the mountains into the great California valley, brightened occasionally with Carson's promising stories about it. Fifteen years earlier Carson had been in this inviting valley, only a short distance to the west. Late in February a pass was reached through the Sierra Nevada. The impressive height of this range, even surpassing the Rockies, explained graphically the vast interior basin they had left behind; no river could possibly have escaped over it.

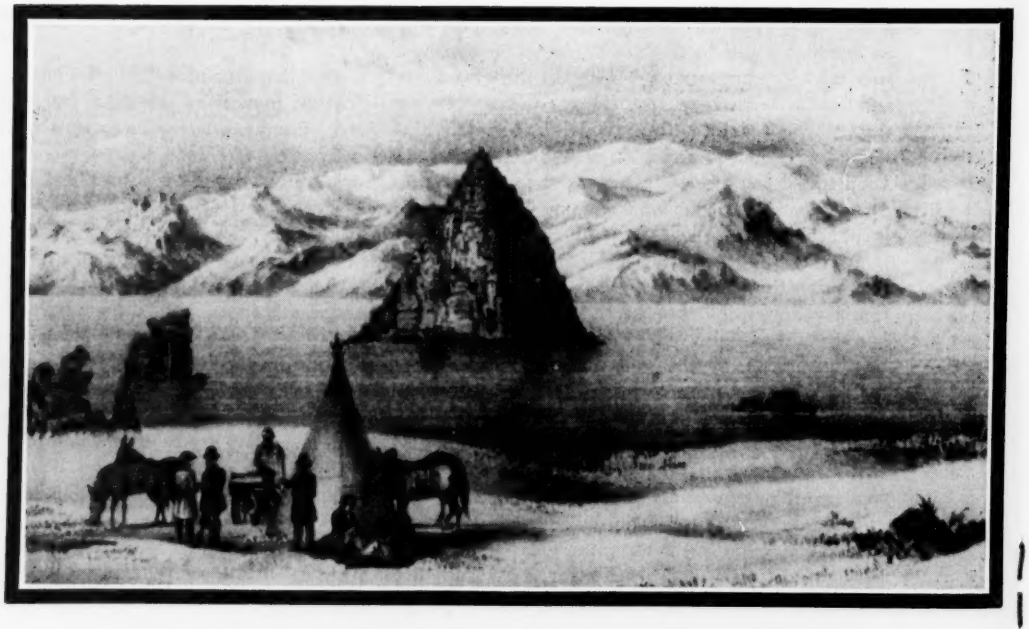
On February 21st just before sunset Frémont recorded a shining line of water merging with an even broader one in the valley far below. "We knew that these could be no other than the Sacramento and the bay of San Francisco; but, after our long wandering in rugged mountains, where so frequently we had met with disappointments, and where the crossing of every ridge displayed some unknown lake or river, we were yet almost afraid to believe that we were at last to escape into the genial country of which we had heard so many glowing descriptions, and dreaded again to find some vast interior lake, whose bitter waters would bring us disappointment. On the southern shore of what appeared to be the bay, could be traced the gleaming line where entered another large stream; and again the Buenaventura rose up in our minds."

Río Buenaventura proved to be an imaginary river. Returning to Utah Lake by way of the Mojave Desert in the spring, Frémont had confirmed the existence of this basin having no outlet to the sea. Still wondering about the inside of that unexplored desert he later followed the Humboldt River in its westerly course across the Great Basin to its termination in desert sand. Could this have been at least a part of the elusive "Buenaventura?" Legend dies hard!

Footnote: *In 1846 Frémont went to the Northwest again as a captain of Topographic Engineers. This footnote in the 1859 edition of Jenkins'* History *throws some light on his true military mission: "He was appointed a Lieutenant Colonel in the regiment of mounted riflemen, on the 27th of May, 1846." He took Sonoma from the Californios, June 6, 1846.*

One of the last of many early maps showing the mythical "Río Buenaventura" rising deep in Nueva California's interior, this is in an 1842 Chapman & Hall (London) atlas "published under the supervision of the Society for Diffusion of Useful Knowledge" and—for good measure?—has two Buenaventuras in the Great Basin, plus a small one running into Monterey Bay! (the Salinas River?). Useful knowledge!

Part of the route of Frémont's second expedition, entering what is now Nevada at the 42nd parallel, discovering Pyramid Lake, then swinging westward at a point where the non-existence of the Buenaventura had become fully obvious, turning north to discover Tahoe, westward for the first winter crossing of the Sierra Nevada. From Tehachapi Pass the route crosses the Mojave Desert to Las Vegas, thence north to the Great Salt Lake. (Base map: "California" in raised relief, copyright 1955 by Aero Service Corporation, Philadelphia 20, Pa., reproduced by permission)



This somewhat fanciful depiction of Frémont's camp at Pyramid Lake appears in Report of the Exploring Expedition to the Rocky Mountains in the Year 1842, and to Oregon and North California in the Years 1843–44, *by Brevet Captain J. C. Frémont (Gales and Seaton, Washington, D.C., 1845). The picture undergoes changes in later works.*

Sources of "the Buenaventura"

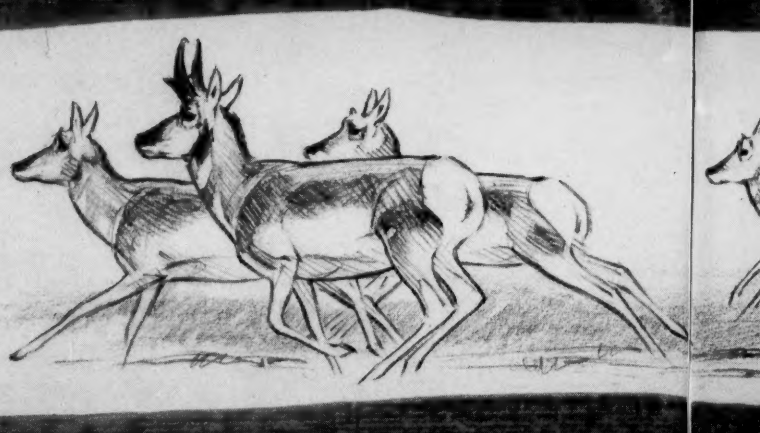
The young Pathmarker of the West, John Charles Frémont flashed like a meteor across the history of American expansion to the Pacific during the four years beginning with 1842 and ending with Bernard DeVoto's "Year of Decision"—1846. Historians have been debating, ever since, his role in stirring events, particularly in the seizure of California, that year of the Bear Flag Revolt. As explorer of unknown lands, however, and as leader of men through hardship and danger, and as careful observer and reporter, Frémont is rightfully ranked with Lewis and Clark, John Wesley Powell, and but few others who went out and captured the paramount facts of the vast western wilderness. Frémont wrote ably, and indeed modestly, of his exploits, always mindful of his debt to Kit Carson, Joseph Walker, and other stout mountain men who broke trail with him; and the story has been kept fresh for a century by many interpreters and biographers, notably F. S. Dellenbaugh and Allan Nevins. DeWitt Clinton Professor in Columbia University, Allan Nevins has recently provided us with a fresh collation from Frémont's own *Report of the Exploring Expedition to the Rocky Mountains in the Year 1842, and to Oregon and North California in 1843–44*, widely current in its time but which "has found no modern republication," as Professor Nevins says in his Preface to:

Narratives of Exploration and Adventure. By John Charles Frémont. Edited by Allan Nevins. Longmans, Green & Co., New York, 1956. ix + 532 pp., maps. $8.50.

If you have been intrigued by Joseph L. Parkhurst's vignette of the explorer demolishing a long-held geographical fiction, you are urged to pick up the threads leading to and depending from the Buenaventura episode, presented here in Frémont's own words—a fascinating armchair adventure. The book opens with Nevins' essay on "Frémont as an Explorer." Mindful of the modern reader, the editor has judiciously deleted some passages detailing astronomical and other minute observations characteristic of the quite scientifically minded Frémont, to speed us along the trail. It is intriguing, to some of us exciting, to match Frémont's landmarks with our own knowledge and modern maps, and to tie things in with other historical events. Nevins aids us with his never dull footnotes grouped at chapter endings (incidentally, the printer has done him dirt in chapter 8 with a misplaced [33, page 350] which throws the following ones into utter confusion with the notes themselves, from [33] to [40]). A Nevins footnote (page 372) summarizes the Buenaventura idea as known to Frémont; and it is pertinent and worthwhile here to quote the explorer himself, as he takes final leave of that idea, April 14, 1844, in the Tehachapi Pass, as – reflecting on what lay

(Continued on page 32)

HENRY H. SHELDON



HOW FAST DO THEY RUN? That is the perennially favorite question when sportsmen gather around the campfire or the hunt club bar to chew over the days afield in pursuit of fleetfooted game. The subject of wild animal speed is kept within easy reach in the front drawer of the hunter's mind, where he can freshen it up at the drop of a red hat—with his own pet theory. Every man has one, but few cherished guesstimates are substantiated by proof—especially any kind acceptable to science.

A real sportsman, a sober observer not given to buck fever, resents being told that his neighbor's new jet-styled automobile was gasping on all eight in the dust of a band of antelope which were "breezing" at 70 miles per hour.

Perhaps the auto itself is responsible for the present-day exaggeration of speed in hoofed game. In the old days when the hunter got up before daybreak to hitch his team to the buckboard and breeze away at a good 12-mile-an-hour clip, he would have swallowed his quid if told that an antelope could run at 40 miles an hour. But today he has seen automobiles stream past at an easy cruising seventy. Why not antelope? Our old speed marks have been lost in the fumes of modern cars and jet planes. The storyteller bent upon astonishing must hit ever higher figures to register.

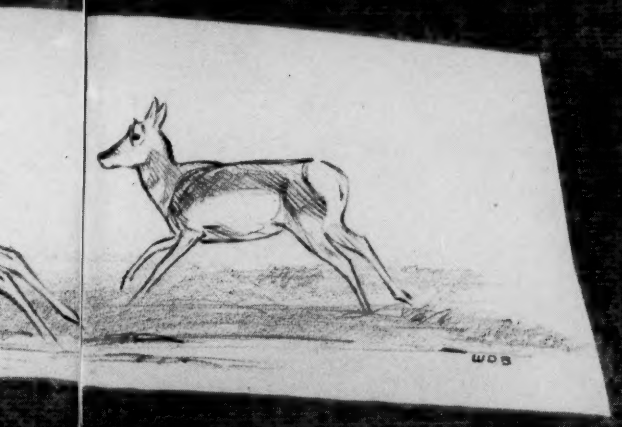
But the antelope has not taken to wheels. He is traveling no faster than he was when Barney Oldfield couldn't get away from his own dust—putting on no more speed to outrun a motorized hunter than to elude a sabre-toothed tiger.

Campfire tales need drama—I've sat around too many glowing heaps of embers under the stars, both yarning and listening, not to sympathize with this ancient need. But when it comes to the printed word, two-score years of splitting hairs and feathers as a naturalist make me little inclined to accept hopped-up enthusiasm in place of facts.

There is no question about the antelope being top speedster among North American animals, not excepting the thoroughbred horse.

The swift and beautiful flight of a band of antelope racing over the sagebrush deserts or the grassy prairie lands—their white rump patches rising and falling, glinting in the sun, as they turn in unison like a flock of sandpipers, here, there, and away into the haze of a camouflaging horizon—is an unforgettable picture. Anyone who has had the good fortune to see an antelope going places in earnest will agree that it skims over the ground like a bird awing—and the majority of writers seem to feel that since the antelope is our fastest animal he must be quoted in high figures. I've read of antelope speeds all the way from 50 to 74.4 miles per hour, each reputedly authenticated by the automobile speedometer. Most sportsmen, it appears, would like to believe that an antelope can do sixty. From my own carefully checked experiences in chasing him, on the other hand, I would be willing to lay a bet that no antelope could get away from an Oregon traffic cop leveled off at 42 miles an hour.

Some years ago while collecting antelope in northern California in the interest of science, I gave chase to a buck antelope which had got himself temporarily corraled in a desert trail bounded by barbed wire fences. Since I had already secured a buck as a specimen, I had, regarding this one, no more ulterior motive than a desire to press him just enough to make it hard



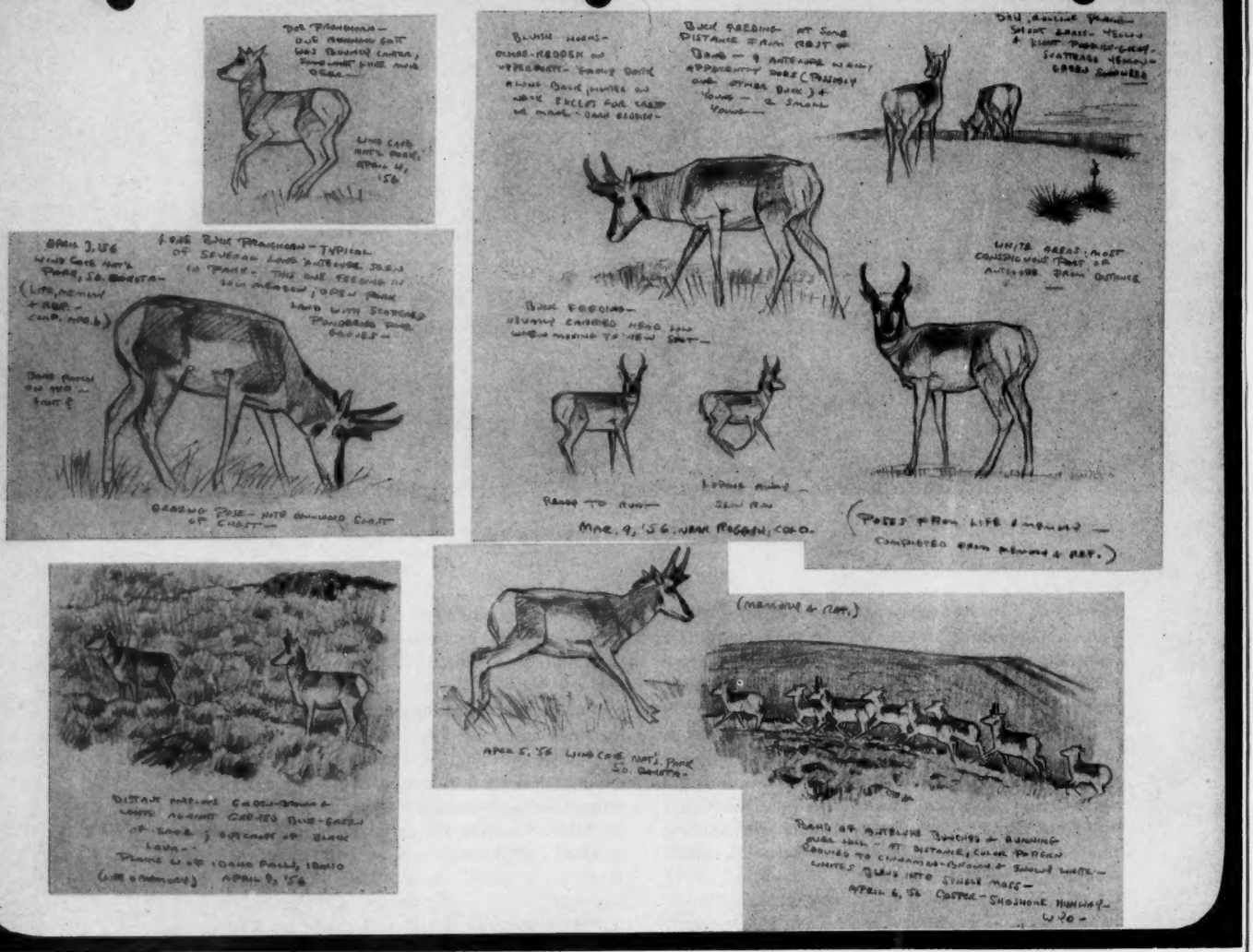
for him to leap the fence (only a low fence, I might add, would induce an antelope to jump—it prefers going through or under the wires). With no chance to evade the car, he stretched himself out. For a quarter mile the speedometer needle hardly wavered from 39 miles per hour, and at this speed I was close enough on his button of a tail to have roped him.

Since that experience I have believed this to be the approximate maximum of antelope speed. Some years ago when the five-day open season on antelope was offered by the State of Oregon, I had occasion to substantiate this belief. I went into the Hart Mountain region of southern Oregon with the primary purpose of verifying or contradicting my original estimate of antelope speed.

By rare luck an exceptional opportunity for testing the matter presented itself just at dusk one evening. A band of does and bucks was migrating out of the country ahead of a nest of hunters. They were headed to cross the road along which I was driving. I speeded up. When less than 100 yards from the road the band swerved and gave me a beautiful parallel race. As I

When we were right on their tails on "fast track" terrain, they couldn't gain an inch at 42 miles per hour. (Author)

The drawing above is a field sketch from life and memory by William D. Berry of San Francisco.



A page from the field note book of William D. Berry, young artist and naturalist with the National Park Service and author, with his wife Elizabeth, of *Mammals of the San Francisco Bay Region*, California, 1959 (see Reviews).

drew even with them, it was apparent they were extending themselves. They were determined to cross the road, and did their agile utmost to outdistance the pursuing car. We raced hood-and-neck, while the speedometer needle held at 38 miles per hour. This was uneven sagebrush terrain and no doubt prevented top speed. When the leaders turned toward the road, despite the car, I rolled up to meet them. They gave up, and swerved back toward the hills.

A few years later my last and most exciting experi-

Pronghorn does and fawns. (Jim Yoakum)

Pronghorn fawn.
(Jim Yoakum)

ence—certainly the one that put a period to any further need for testing antelope speed, at least for my own satisfaction—happened while I was on an animal survey at the Charles Sheldon National Antelope Refuge in Nevada. John Schwartz, superintendent of the refuge, got me right up to a band of pronghorns with conditions ideal for the fastest possible run.

The animals were enjoying their midday rest period on a dry lake bed, when the pickup truck suddenly wheeled upon them.

Their getaway was as smooth and flowing as that of a bunch of thoroughbreds breezing the back stretch.

John put the car close up to the little band (about twenty) and now with the frightening sound of the motor at their rumps, each individual appeared to be doing its utmost to get out in front. Their bodies literally stretched and lowered to earth as their hind legs worked like animated pistons. Only the sound of hooves biting into the smooth surface of the lake-bed made it real that they were not being propelled by some magic.

The speedometer hit 35 when we caught up with them but when they got really aware of the roaring monster at their heels the needle wavered at 42.

The difference in time of these three tests could be attributed to the varying character of terrain, which could be termed, as in racing, a "slow," "good," or "fast" track.

As a means of comparison, let's see how the race horse stacks up stride for stride with the antelope. The fastest thoroughbreds in the class of Swaps, Citation, and other record breakers of the turf run a mile in approximately one minute and a half (93.6 seconds to be exact) or at the rate of nearly 40 miles an hour (under approximately 125 pounds of weight). If you can draw sufficiently upon your imagination to picture an antelope jumping away from the starting gate by the side of Swaps, in a mile race, would you expect the horse to be 640 yards—more than a third of a mile! —behind the antelope as it flashed across the finish line? Well, that's the way it would be if the antelope had been running at the 60-mile-an-hour clip popularly ascribed to it.

The man who has been led to believe that the antelope can run at the 60-mile rate must consider that the animal would cover a distance of 88 feet every second! Even if he could make it in one jump, I still wouldn't believe it.

The Allen Hummingbird — HOW MANY NESTS A YEAR?

DOROTHY F. LILLY & ROBERT T. ORR

POETS who are not too well versed in the study of birds are given to calling the robin the harbinger of spring. Along the central California coast, however, where robins winter in great numbers, the real harbingers of spring in the world of birds are the tiny Allen hummers, the first of our summer visitants. They arrive in numbers by the middle of February after having spent the winter in northwestern Mexico. Perhaps the observations recorded here will provide a possible explanation for their early northward migration before winter is really over.

Once these little birds arrive they are not bashful at making their presence known. Not only are they noisy and conspicuous but if flowers are abundant so are the hummers. The resident Anna hummingbirds, whose squeaky voices have been heard all winter, seem to be overwhelmed by these much noisier summer visitants. Despite their abundance, however, we have much to learn about their habits. Most hummingbirds are too small to band so that we can only venture a guess as to whether the female that nested in the garden this year is the same one that was there last year. This problem has yet to be solved; but one of the authors (Lilly) had the good fortune as well as the time to follow the complete nesting activities of one female Allen hummer each year for three successive years in her garden at San Carlos, California. The results of these observations have shown that during each of these three nesting seasons one female of this species (not necessarily the same individual each year) built at least three nests and laid at least three sets of eggs.

These observations were begun in early April, 1955 and continued during each nesting season through 1957. In brief, during the spring and summer of 1955 one female was seen to raise three consecutive broods of young, each brood consisting of two nestlings. That it was the same female was determined by the fact that in each instance she fed the young of the previous nesting while the next nest was being constructed and even to some extent during the following period of incubation.

Again in 1956 the activities of a female Allen hummer in the same garden were followed with the same results as far as broods of young were concerned. Whereas in 1955 three separate nests were constructed and used, only two nests were used in 1956 although three were built. This may seem a bit confusing but the explanation is very simple. The first nest was completed that year on March 7 and two days later it contained two eggs. These eggs hatched on March 24. By the time the young were twelve days old the female spent very little time brooding them and was seen occasionally to explore adjacent vegetation. Several days later she began building a second nest, not neglecting her duties to her young, of course. This nest was almost complete by mid-April. At this time, however, the newly constructed nest was destroyed by unknown causes. The young left the old nest on April 17. The next day the mother was observed feeding the young in shrubbery near the nest they had left. Immediately following this she was seen to slip into the old nest. Ten minutes later, when she left, the first egg of the second clutch had been laid. This nest then served to raise two broods and later in the season another nest was built for the third nesting which was accomplished successfully.

When February came around in 1957 a female Allen hummer with strong maternal instincts again appeared in the garden. In fact she built four nests and laid four sets of eggs although her success as far as young were concerned was not as good as her predecessors (?) in 1955 and 1956. Her first nest was completed and incubation started by February 26. The eggs hatched on March 12 and by March 30 she was building a second nest. The two young left the first nest on April 6 and the two eggs comprising her second set were laid on April 9 and 10. On April 24

Female Allen hummingbird, May 15. (From Ektachrome by D. H. Fry, Jr.)

one of these hatched but the other one proved to be infertile. On May 5 the female began building a third nest. This was completed and contained two eggs on May 14 which was four days before the single young hummer left the second nest. The female fed the latter while periodically off the second nest. The single young left the nest on May 18 and was seen to be fed by the female until May 27. On May 29 the third set of eggs hatched. Sometime on June 1 or 2 the third pair of young died from causes unknown. On June 14 a female, believed to be the same female, began another nest and by June 21 had laid two eggs. This nest was deserted on July 6 with the eggs unhatched.

Whether these observations pertain to one female over a period of three years or whether they represent the activities of a different one each year is not known. It has generally been suspected that two nestings per season is maximum for the Allen hummer, although the resident Anna hummingbird is known to raise three broods occasionally. Perhaps more careful studies on these tiny birds would reveal that multiple nestings of this sort are of regular occurrence and necessary for the maintenance of these species.

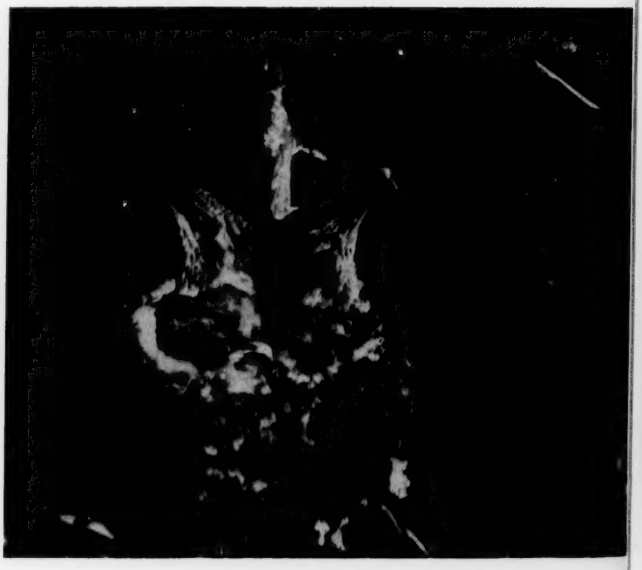
All of the nests of the Allen hummers that were found in the garden were lined on the inside with white plant-floss and well disguised on the outside with bits of lichen. In 1955 the first nest was not found as the young had already left it when they were first observed being fed by the mother. The second nest, however, was ten feet above the ground in a Boston ivy vine that was growing over the southeast part of the house and the third nest was thirteen feet up in an Italian cypress. In 1956 the first nest was found in a toyon bush three feet eight inches above the ground, the second nest in Boston ivy on the northeast part of the house thirteen feet above the ground and the third nest six feet above the ground in a Japanese redwood. The first nest built in 1957 was ten feet up in the same Italian cypress used in 1955. The second nest was placed six feet up in another nearby Italian cypress. The third nest was ten feet up in the Japanese redwood used the year before and the fourth nest was twelve feet above ground in the Boston ivy on the northeastern side of the house.

During the three years over which these observations were made one became familiar with many intimate details in the lives of these birds. They arrived punctually in mid-February and departed in mid-July. Family life is a bit different from that of most other birds. The male hummer is conspicuous by his absence from the nesting area. He is tolerated there only during the nest-building period. The parental duties rest

Allen hummingbird on its nest in Golden Gate Park, San Francisco, on June 1. (Robert T. Orr)

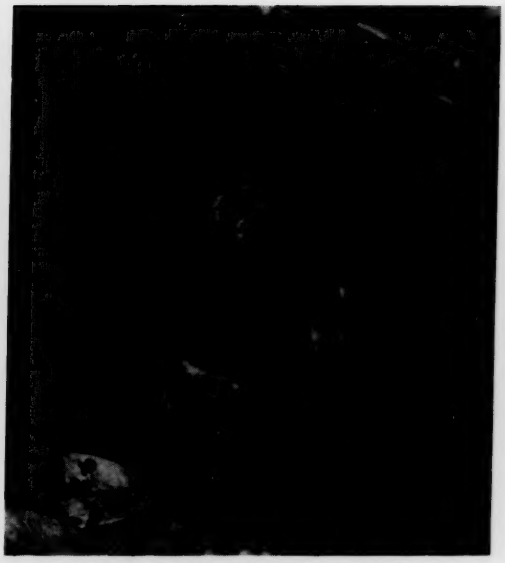
solely with the female. She builds the nest, lays the eggs and incubates them, feeds the young for about three and one-half weeks in the nest and then for some days after they leave it. They are fed regurgitated food (presumably flower nectar and small insects). During this process the female inserts her bill deep into the throat of the young and literally seems to pump food into their stomachs. This may sound like force-feeding but the junior members enthusiastically participate in this activity.

When this strenuous nesting cycle, repeated several times a season, is over it is time to begin a leisurely movement southward toward the wintering grounds where life will be easier and there to wait until the urge to move northward once more makes itself felt.



The Allen's nest on June 14 —the young are now 18 days old and a bit crowded. (Robert T. Orr)

Mother Allen hummingbird feeding her 12-day-old young in Golden Gate Park, June 8. (Robert T. Orr)



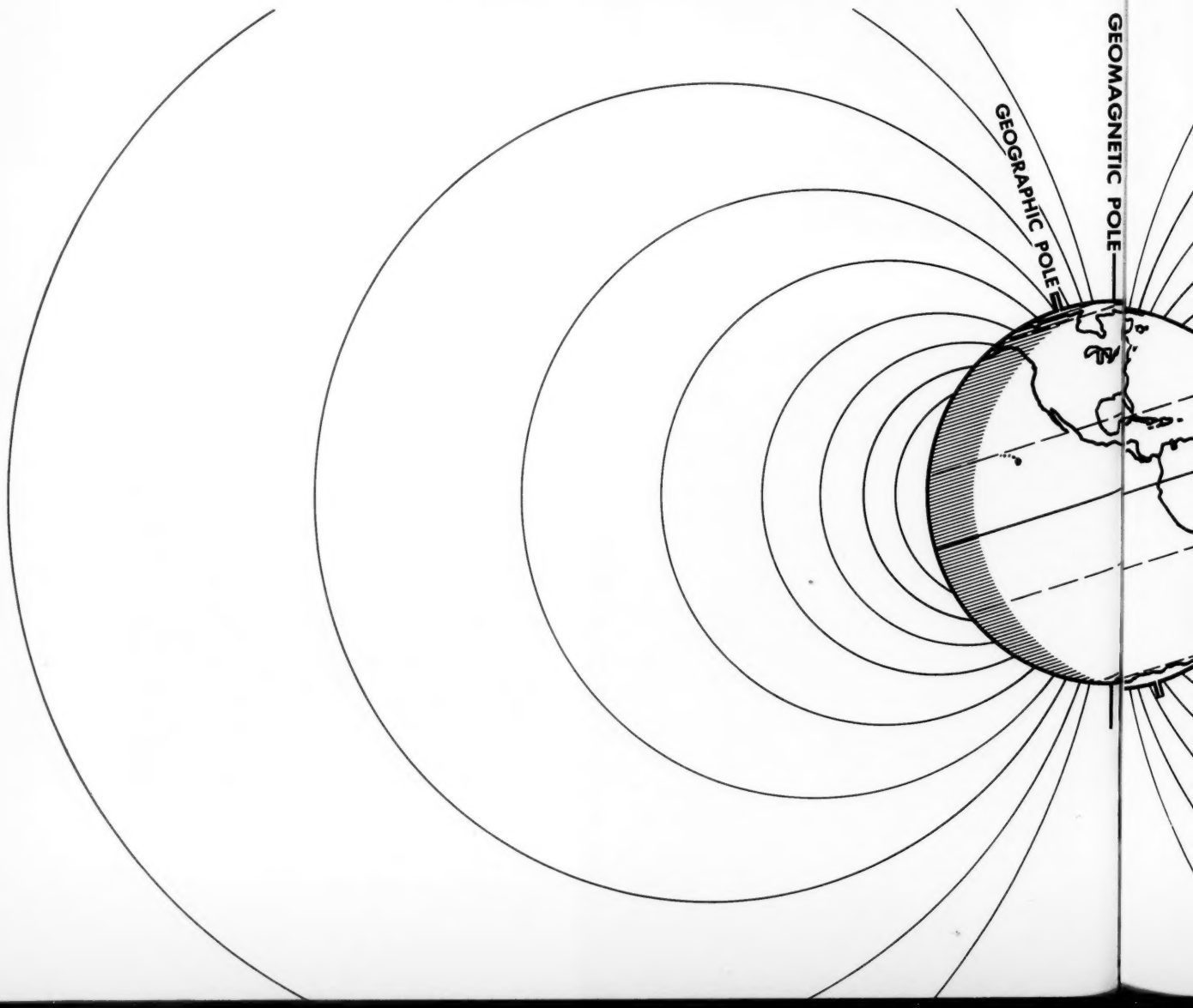
At 19 days (LEFT), the parent is hard put to keep the gaping digestive tracts filled; and at 21 days (RIGHT), the fledglings seem ready to go. (Robert T. Orr)

THE IGY AND EARTH'S RADIATION RINGS

DECEMBER 31 OF 1958 marked the end of the International Geophysical Year, and even though by international agreement many of the programs initiated during the IGY period are being continued, reports are beginning to appear covering results of the various researches made possible by the grand cooperation between nations. The IGY was undoubtedly the greatest nonpolitical stroke for peace and international understanding the world has yet seen. There have always been international coöperation and exchange between the scientists of the world, even—to a degree—during times of war; but the IGY was a period when the national governments gave support to the scientific coöperation. This is nothing short of remarkable in the face of the "cold war" being waged between this country and the U.S.S.R. during the same period.

People have been asking ever since the beginning of the IGY what it was for. What is being learned? And when reports of IGY investigations by scientists of the Soviet nations were not forthcoming, there was the expected reaction from people of this country that "after all you can't trust those Russians." As it has turned out, only a few reports came from our own scientists during the IGY. That was the period of investigation. There now exist such vast amounts of data that reports of conclusions reached from the investigations will likely be appearing for many years. In many cases the investigations have not yet yielded conclusive results, and the projects are accordingly being continued.

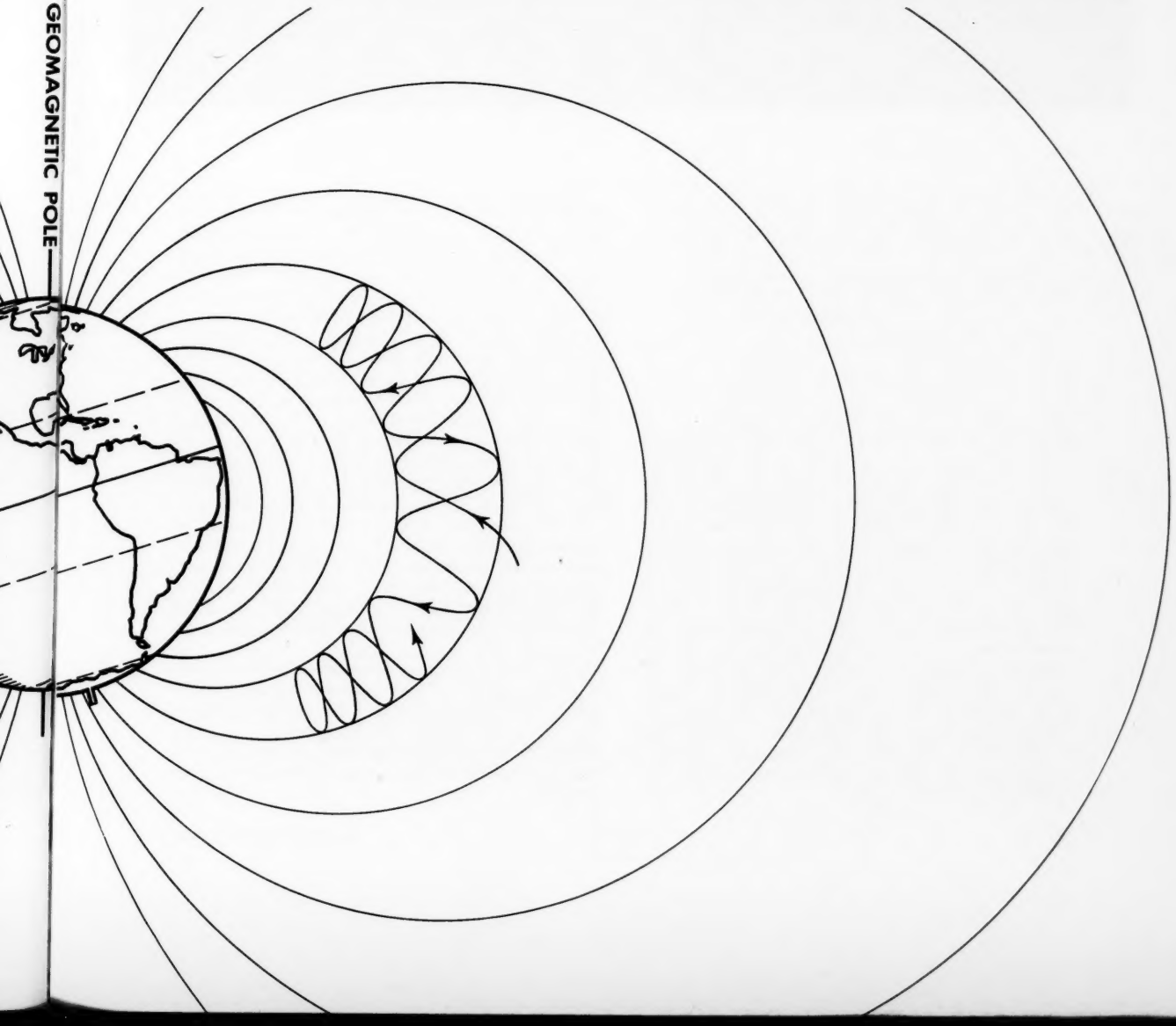
One of the most spectacular results of the IGY (at least from the standpoint of this department) is the discovery and analysis of the radiation rings encircling the earth. While theory had indicated the existence of some sort of radiation belt in the space surrounding the earth, its nature, distance and extent were unknown. This is a feature of the earth's environ-

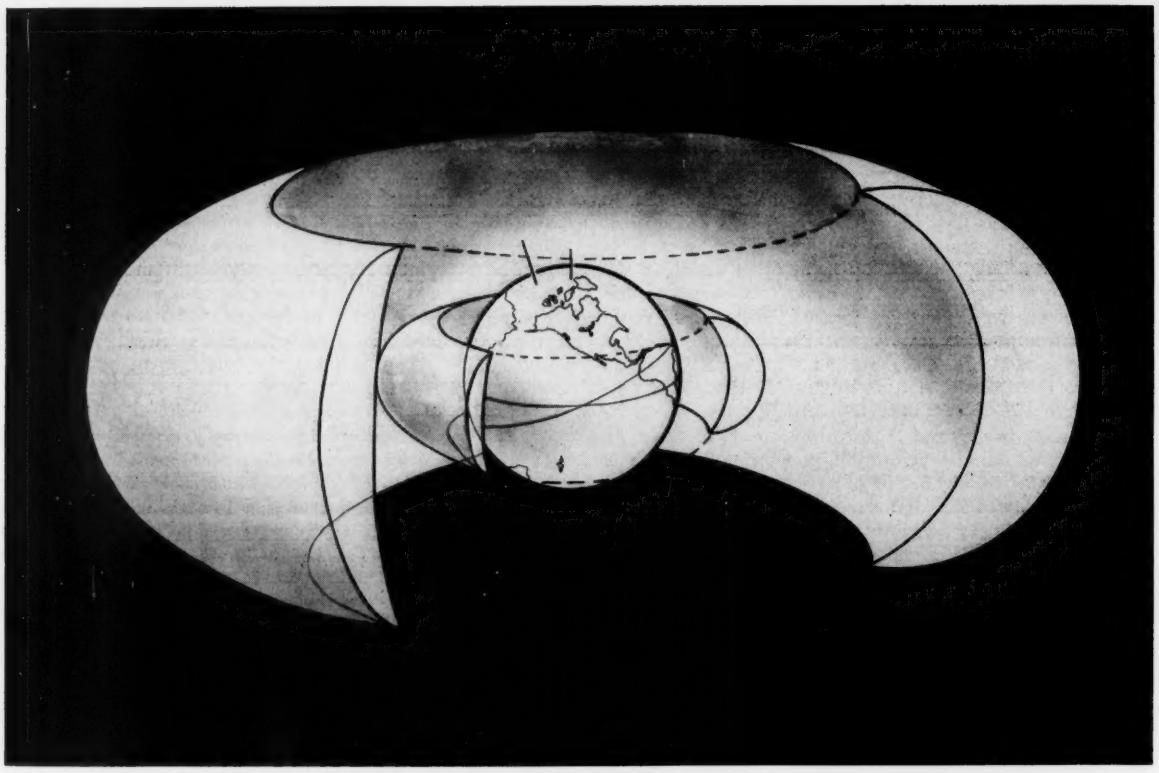


ment which has been revealed by satellites and moon rockets launched by both the U.S. and the U.S.S.R. Either nation could have obtained the necessary data from its own vehicles, but the knowledge would have evolved much more slowly. The nature of these zones which are intimately associated with the earth's magnetic field is now being freely reported in scientific journals by scientists of both nations. The state of our knowledge of this and many other details of the universe is highly advanced because of free communication between men. Dr. Robert C. Miller says, "Without question the greatest single contributing factor in the sudden rise of science and what we call progress was the development of printing." Without mass production of the printed page capable men would be working alone, and as an extension of this, without the free circulation of printed information, men of separate nations and of different societies would remain isolated and all the more intolerant of each other.

Now we can add to the picture of the physical nature of the earth the existence of two rings of electrified particles performing most elaborate gyrations about the magnetic field of the earth. These rings are formed much like the old-fashioned napkin ring. In cross section they would approximate the form of a crescent moon. One is much larger than the other and the larger one changes in size and intensity in direct response to activity on the sun. The plane of the rings lies in the plane of the earth's *magnetic equator,* an imaginary line around the earth corresponding to the geographic equator except that the magnetic equator lies half way between the *magnetic* north and south poles of the earth. The magnetic equator is south of the geographic equator in the Atlantic ocean and

The double set of curved lines drawn around the earth represent a cross-sectional view of the lines of force of the earth's magnetic field. Electrified particles in motion in such a field are made to move in the spiral fashion suggested in the drawing. As the particle moves to higher latitudes, its motion is forced into a tighter spiral, until it is finally turned back toward the other hemisphere. This is called magnetic reflection. It is the reflection which traps the particles within the ring zones around the earth's magnetic equator.





The invisible rings of high energy electrified particles are indicated in this drawing. The rings have been cut away to reveal the crescent form of the cross section. The inner ring is about 2,000 miles above the earth; the outer, about 12,000 to 15,000 miles above. The plane of the rings is inclined to the earth's equator and coincides with the plane of the magnetic equator. Both equators are shown in the drawing.

north of it in the Pacific. The inner ring is located at an average height of about 2,000 miles above the earth. The larger varies in extent but averages within a zone between 12,000 to 15,000 miles above the earth.

Both these zones are described as regions where the earth's magnetic field traps and stores electrified particles. This storage process, according to a theory of Professor S. Fred Singer of the University of Maryland, is far from being a static thing: the trapped particles are moving with extremely high velocities, but cannot escape because the earth's magnetic field causes them to move in a spiral fashion similar to a deformed corkscrew. The particles are evidently both protons (positively charged) and electrons (negatively charged). They move in the odd corkscrew fashion as illustrated in the accompanying figure. This motion results from the same interaction between moving electrical charges and a magnetic field that makes the electric motor work.

The earth behaves as a giant magnetized ball, and the magnetic field around the earth is described by imaginary lines of magnetic force curving outward from the earth at the magnetic equator and converging upon the earth at the magnetic north and south poles. The trapped particles spiral about these lines of force in ever tightening spirals where the lines of force converge. Most of the particles are actually reflected back and forth between the northern and southern hemispheres of the earth without even reaching the atmosphere. Those that leak off the ends of the crescent-shaped zones bombard the atmosphere of the earth to produce the Aurora. This is true mainly of the outer zone. The charged particles are supplied to this zone by eruptions of great streams of particles from regions on the sun closely related to sunspots.

The inner zone, it is believed, is supplied by charged particles created by collisions of cosmic ray particles with molecules of the earth's air. The resulting particles are much more energetic than those forming the outer zone—the strength and density of the particles combine to create over a hundred times the energy.

Both these zones must be avoided when man ventures into space, for such particles bombarding the hull of his ship would create X-rays strong enough to kill him in a few minutes. His "escape hatch" is clearly marked. When he leaves the earth, he must leave by one of the polar corridors—through the hole in the doughnut. G.W.B.

From caribou to coatimundi

The Mammals of North America. By E. Raymond Hall and Keith R. Kelson. The Ronald Press, New York. 1959. Vol. 1: xxx + 546 + 79 (Index) pp.; vol. 2: viii + 537 + 79 (Index) pp.; 553 figs., 500 maps, many unnumbered illus. $35.00.

Although this two-volume work probably has little popular appeal, it represents the most outstanding contribution in the field of mammalogy that has been published this century. To the student of mammalian taxonomy and distribution this publication will be indispensable. It contains references to the more than 3,800 kinds of mammals found between Panama and Greenland. There are descriptions and diagnoses of all of the orders, families, genera and species, keys to families, genera and species, and maps showing the geographic distribution of all of the species and subspecies of North American mammals. In addition to general distribution, important marginal records are indicated on the maps and these are listed under the appropriate species or subspecies. Line drawings of over 500 skulls as well as sketches of many different kinds of mammals add greatly to the value of these two volumes.

The senior author, Dr. E. Raymond Hall, is Director of the Museum of Natural History, Summerfield Distinguished Professor and Chairman of the Department of Zoology at the University of Kansas. Dr. Keith R. Kelson, the junior author, worked full time on the preparation of this work from 1949 to 1954 while he was a Research Associate at the University of Kansas. He is presently on the staff of the National Science Foundation. R. T. ORR

Life under the coconuts

Coral Island: *Portrait of an Atoll.* By Marston Bates and Donald P. Abbott. Charles Scribner's Sons, New York. 1958. 254 pp., 31 photographs, 2 maps. $4.95.

"Nature and man in the Pacific world"—there, in *Pacific Discovery's* subtitle, is the story of this very engaging book *Coral Island.* The authors—Marston Bates is Michigan professor of zoölogy, Donald Abbott a Stanford assistant professor of biology on the staff of Hopkins Marine Station—brought the story and many excellent pictures (some of Don Abbott's Kodachromes were invaluable to your editor recently in a lecture to this same Pacific theme of nature and man) back from the obscure atoll Ifaluk. Six years ago these two and five other American scientists spent several months absorbing the essence of the biological broth from plankton and soil organisms to man in the virtually sealed stewpot of a sea island still unaltered by the ingredients of our civilization. The scientists in turn felt themselves now and then being absorbed by this broth which, with respect to the elements of human life, was pleasantly uncomplicated. And just like most sojourners from the modern world on remote tropic isles, they left with mixed feelings when the time came.

What comes of all this besides a charming narrative? Ifaluk was pinpointed on a time-chart: its shape, climate, flora, and fauna are mapped, tabulated, surveyed and collected. Most important, quite certainly, was the study of "the natural history of Micronesian man," with an assessment of "present essential needs against present resources" which showed "a surplus, real or potential, in almost every-

SKY DIARY

June, July 1959

(Pacific DAYLIGHT SAVING TIME used throughout)

Phases of the Moon

New Moon	June 6	4:53 A.M.
First Quarter	13	10:22 P.M.
Full Moon	20	1:00 P.M.
Last Quarter	27	3:12 P.M.
New Moon	July 5	7:00 P.M.
First Quarter	13	5:01 A.M.
Full Moon	19	8:33 P.M.
Last Quarter	27	7:22 A.M.

The Planets

Mercury: Too close to the sun for observation during May and June, being in superior conjunction on June 2.

Venus: A prominent object in the western sky after sunset during May and June (mag. −3.9 by mid-June). Reaches greatest eastern elongation on June 23 when it will be setting almost three hours after sunset. (see Mars)

Earth: Summer begins on June 21 at 8:50 P.M.

Mars: During May in Gemini south of Castor and Pollux, setting before midnight in the northwest. By mid-June it has faded to mag. +1.9 and will be setting about three hours after sunset. On June 14 it will be close to Venus. Venus will be slightly to the north and some 200 times brighter than Mars.

Jupiter: During May and June in retrograde motion in the constellation of Libra. Of magnitude −2.0, it rises about an hour after sunset the first week of May and will be setting about 2 A.M. by the end of June. It will be in opposition on May 18 when its distance from the earth will be 405,800,000 miles.

Saturn: During May and June in retrograde motion in Sagittarius rising before midnight during May (mag. +0.5). It is in opposition on June 25 so that it will be visible from sunset to sunrise.

C.F.H.

High Altitude and Satellite Rockets. A Symposium sponsored by The Royal Aeronautical Society, The British Interplanetary Society and The College of Aeronautics held at Cranfield, England, 18th–20th July 1957. The Philosophical Library, Inc., New York. 1959. 136 pp., halftone and line illus. $15.00.

Before the launching of the first satellite a symposium was put together at Cranfield, England, for the hearing and discussion of 12 papers dealing with various aspects of rocketry and satellite instrumentation. These papers and the discussions following them, as presented in this volume, are not too technical to appeal to the informed layman. They are, moreover, prophetic enough of things that have come to pass or that are expected in the near future, to guarantee reader interest. Not the least fascinating of the papers is the one entitled "Psycho-Physiological Hazards of Satellite Flight." G.W.B.

Everyday Meteorology. By A. Austin Miller and M. Parry. Philosophical Library, New York. 1958. 270 pp., 22 halftone plates, 77 text figs. $7.50.

This is a thorough but non-mathematical treatment of meteorology approached from the angle of the weather we experience. It is intended to give the layman an understanding of the origin and evolution of weather conditions, and it succeeds admirably. While it was written by Britishers and consequently emphasizes weather conditions in and around the British Isles, the basic material regarding the weather is applicable to any part of the northern world.

There are a few rather complicated relationships in the behavior of air under changing pressure and temperature which have been remarkably well explained and should cause the reader no difficulty. The illustrations—both drawings and plates—are excellent. It may be summed up as "a good book." G.W.B.

thing except fishes" (i.e., protein food). What will all this scientific scrutiny accomplish, especially for the Ifalukians? Don Abbott, in closing the book, muses on the probability of a fat monograph gathering dust on academic shelves. He also brings his insights to bear on the probabilities of Ifaluk's future, as change comes inevitably and the island finds itself immersed in the larger broth of the pan-Pacific world. The most important outcome of this Pacific Science Board study, we believe, is not the analysis of biotic elements, their description and tabulation, but the synthesis of the thinking and feeling of seven intelligent, sympathetic, and articulate men, representing us the trustees, about the actuality and potentiality of human life in one vital (because it exists) part of our Trust Territory in the Pacific, and their sharing that thinking and feeling through this book with a far larger number of us than those who read scientific monographs. This could have some effect on the future of more than one coral island.

Maple leaf land

Canada: *Tomorrow's Giant*. By Bruce Hutchison. Alfred A. Knopf, New York. 1957. xii + 325 + vii (Index) pp., 28 photographs, 6 maps. $5.00.

This is a wonderful book to read if you are looking northward for vacation lands, or if you just want to know what the great and growing nation above us on the map is like. You will be captivated by the flowing poetry of Bruce Hutchison's prose, meet interesting personalities, delve into a rich history, and find fresh landscapes where nature is very old and man still young upon them. You will take a leisurely journey westward from somnolent but stirring Newfoundland to vigorously awake and beautiful British Columbia, the author's beloved home province. You will have been to Canada, even though you remain at your own fireside: this is a magic book.

Bay Area Bouquet

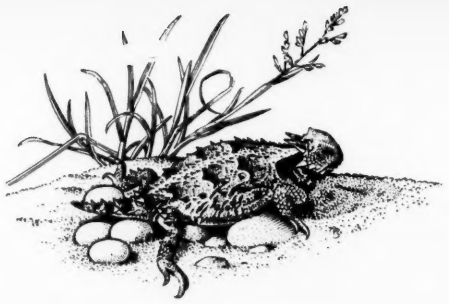
California Natural History Guides. University of California Press, Berkeley and Los Angeles. 1959. (Paper) $1.50 each.

Introduction to the Natural History of the San Francisco Bay Region. By Arthur C. Smith. Drawings by Gene M. Christman. 72 pp., line drawings, photos and art in full color.

Mammals of the San Francisco Bay Region. By William D. and Elizabeth Berry. Illustrated by William D. Berry. 72 pp., line and full-color drawings.

Reptiles and Amphibians of the San Francisco Bay Region. By Robert C. Stebbins. Illustrated by the Author. 72 pp., line and full-color drawings.

Native Trees of the San Francisco Bay Region. By Woodbridge Metcalf. Illustrated by Mary B. and Fred Pomeroy and Eugene Murman. 72 pp., line and full-color drawings.



Readers of *PD* have been treated to a preview of this series through publication of part of Arthur C. Smith's *Introduction* and a selection of illustrations from this and other volumes (March-April 1959). Such a sample can never do justice to the whole. This is specially true in this instance because we could have none of the color. And the color plates alone are, as the saying goes, worth the price of admission.

One of *PD's* editors, Dr. Robert C. Miller, has commented at length, in his review in the *San Francisco Chronicle* for Sunday, 31 May, on the natural history aspects of the series. In the same issue Art Smith, as series editor, gave background highlights—how the series was conceived, its evolution, and the eventual production of the first four of many projected volumes. The present reviewer would like therefore to talk mostly about the illustrations, discussing the volumes in order.

The *Introduction* has, besides Gene Christman's carefully detailed line work—which is formal to the point of being just a bit static—a very lively schematic centerspread cartograph in full color of the Bay Area and some of its most representative animals and plants, and—embracing this—16 full-color photographs of various habitats. These are rocky shore, oak woodland, chaparral, redwood forest, urban, etc., all well selected and nicely reproduced.

What makes Bill Berry's *Mammals* so wonderfully alive is his combination of a fine, free, yet perfectly controlled technique in both line and color, with the essential ingredient of *knowing* animal structure and behavior—the latter as it can only be had through patient observation.

Bob Stebbins of the Museum of Vertebrate Zoölogy (UC, Berkeley) is already well known as author-artist through his *Amphibians and Reptiles of Western North America*. His line work is beyond praise, with his animals sharply stylized yet three-dimensional and very much alive. But the color plates in this volume should be singled out for special mention. The first impression is of outlined (background deleted) color photography. The second look brings wonder at the artist's skill and the realization that here is something possibly superior to photography as an aid to recognition. Absolute color register in the printing is essential for this kind of work to achieve its effect—all plates are perfect in our copy.

Mary and Fred Pomeroy have used bold silhouettes broken with white for quick recognition of tree shapes, and the same device with more detail for leaf and fruit close-ups. Again, in the *Trees* volume, the color plates must be singled out. Eugene Murman's watercolors are part of a special collection in the University of California Library, Los Angeles. Here too is outlined work in perfect register. For each of 32 species a leafed branchlet (or needle cluster), blossom, fruit, and seed is shown in meticulous detail.

Taking all four volumes, the artists as well as the authors have set high standards for those coming to shoot at. One of the artists to come is speaking here! D.G.K.

The drawings (LEFT TO RIGHT) are by William D. Berry, Robert C. Stebbins, Gene M. Christman, Mary B. and Fred Pomeroy. (From *California Natural History Guides*, courtesy University of California Press)

From the Andes to Annapurna

They Explored! *Humboldt, Livingstone, Frémont, Hedin, Scott, Herzog.* By Rhoda Hoff & Helmut de Terra. Henry Z. Walck, Inc., New York. 1959. 120 pp., maps. $3.25.

Any selection of a very few representatives of a large field of endeavor must be on the face of it arbitrary. Since this quite unpretentious book was put out for youngsters age 10 and up, it is unencumbered with preface or other statement of aims or basis for the selection of the particular six—the title is the one clue. So what can be said on this score but that the six are men our children should know something about, and this book does a very good job of introducing them? The life and major undertakings of each are outlined briefly, then a passage or two from his writings is given. The biographical parts are written straight out, not down, concession to reader youth showing only in the sifting for most positive traits and comprehensible motives. If this simple anthology sends young readers to libraries for such things as de Terra's own popular biography of Humboldt, the gripping literature of polar exploration, or *Annapurna,* it will serve well. One of the two Frémont passages, by the way, is about the winter Sierra crossing that followed the search for the Buenaventura. This book is sending the reviewer to a library for some Sven Hedin, little more than a great name till now, to—D.G.K.

P.S. to the Publisher: Was it impossible, at the price, to put in even line-drawn portraits to liven up the format for kids? There is plenty of blank page space.

Parks, forests, and fishing

America's National Parks: *A Photographic Encyclopedia of Our Magnificent Natural Wonderlands.* By Nelson Beecher Keyes, Doubleday & Company, Inc., Garden City, New York. 1957. 260 pp., 33 full-color, 494 black-and-white photographs, 5 maps. $7.50.

Here is a lavish pictorial spread of all the national parks of the fifty states and Virgin Islands, plus the 16 national parks of Canada. Descriptive, information-packed pages of text are sandwiched in, and the location maps are beautifully drawn by Rafael Palacios.

The National Forests. By Arthur H. Carhart. Alfred A. Knopf, New York. 1959. xiv + 289 + ix (Index) pp., 44 photographs, map. $4.75.

This summer several millions of us will spend all or part of our vacation time getting to and making use of some of the more than 180,000,000 acres of National Forest land in 45 states. Your family or mine may be one of the 40,000 families camping or picnicking at any one time in 4,900 camp grounds on 150 national forests. Of the all-too-small army of public servants—supervisors, rangers, fire control men, and all—who work hard at keeping the forests available for our enjoyment, we dare say a few, wearily hitting their bunks at night, may take a moment to wish more people understood the nature and purposes of the forests, something of their history, and more than a little of the make-up and functioning of the Service taking care of them and the visitors on them. Conservationist, outdoor writer, and sometime Forest Service landscape architect, Arthur H. Carhart has provided in *The National Forests* a book to give us some of this understanding and leave us with greater appreciation of what we have in these forests. Another leading conservationist, Joseph W. Penfold of the Izaak Walton League, wrote the Introduction to this richly-packed book which would gain, in a second printing, from some editing (to rid it of such orthographic curiosities as "Vizcai'no," "Bahi'a," "Lake Elisnore," "Honsku," Point Barrows," and in the Index, "chapparal," "Ginko," "Carl Schurtz"—too many for a good Knopf book!).

Good Fishing. By R. W. Eschmeyer and George S. Fichter. Harper & Brothers, New York. 1959. 124 pp., line drawings by Ed Zern. $2.95.

Completed by the junior author after the senior's untimely death, this little book sums up the findings and the efforts of a leading fish biologist and conservationist, Dr. Eschmeyer, who took the unorthodox stand that we could have more fishing and more fish and therefore more fishing. Where his methods of improving fishing waters have been put into effect, he has been proven right. Now fishing laws and regulations are being liberalized in state after state. Take this fishing with you this summer.

On the Sunset trail

For quite a number of years now, Lane Publishing Co. of Menlo Park, California, through *Sunset* magazine and a steadily growing list of how-to-do-it books, has been helping Far Westerners of middle to upper income brackets to more abundant living. The Lane "how-to" message is not how to increase an already comfortable (or better) income, but how to spread what you have over more of the good things "Western living" offers at favorable levels—attractive housing, relishable eating, and travel. Possibly it is in the latter department that Sunset Books have the most to spread before the most people in the way of useful information and convertible inspiration. A fair number of us are still looking for that lotus orchard connecting a lanai with a swimming pool; but practically everybody—to judge by vacation-time traffic—takes weekend to three-week trips. Even the most experienced vacationers could, in some degree, be helped to greater comfort and convenience in camp and on the road by such practical guides as the *Family Camping Book, Western Campsite Directory,* and *Outdoor Family Fun in the West;* and to a wealth of new places to go by the Sunset Discovery Books—*Arizona, Hawaii, Oregon, Washington, Gold Rush Country.* All this is by way of introducing four new or recent titles in the Discovery line to *PD* readers: **Mexico** (96 pp., $1.75); **British Columbia:** *with Canadian Rocky Mountain National Parks* (96 pp., $1.75); **Northern California** (128 pp., $1.75); **Southern California** (128 pp., $1.75)—these are by the editorial staffs of Sunset Books and *Sunset* Magazine; and **National Parks in California,** by Dorr Yeager, former Regional Chief of Information, National Park Service (96 pp., $1.95)—this not only includes the four parks, Yosemite, Lassen, Sequoia, Kings Canyon, but also the monuments, Death Valley, Cabrillo, Channel Islands, Devils Postpile, Joshua Tree, Pinnacles, Lava Beds, Muir

Woods. It is impossible to convey in brief space an adequate sense of the attractiveness of these 8 x 11-inch, heavy paper-bound numbers, with their profusion of photographs, handsomely clear maps with shaded relief, and expertly written text. It won't hurt to suggest here, however,—on the basis of knowing several of the Sunset staffers personally,—that the excellence of these useful books stems not only from competence but from enthusiasm. These people down in Menlo Park—travel editor Martin Litton, book editor Paul Johnson, promotion manager George Pfeiffer, magazine editor Proctor Mellquist, the Lanes and their host of associates—love the outdoors, like to camp out, travel, and discover ways of getting the most enjoyment out of such activities. Sunset Discovery Books are designed to help the rest of us get the most, too.

D.G.K.

WRITING A BOOK?

Then you too must have pondered the question, "How can a significant work which is not necessarily a candidate for the best-seller list, be published?"

Our extensive experience in regular commercial and subsidy publishing has made clear to us the need for a 100% honest, selective and professionally skilled cooperative publisher. THIS IS THE FUNCTION WE FULFILL. Our books are handsomely designed, carefully edited, and intelligently promoted. Our books sell, not in explosive spurts, but steadily and regularly. Our imprint is esteemed by libraries, bookstores, reviewers, and scholars. Send your manuscript, fiction or non-fiction, without obligation, for editorial evaluation.

The American Press, Inc.

Atten.: MR. LANGFORD

489 FIFTH AVE. **New York 17, N. Y.**

EASY CHAIR COMFORT

LONG RUGGED WEAR

LEVI'S

REG. U.S. PAT. OFF.

AMERICA'S FINEST OVERALL

Since 1850

(Continued from page 17)

behind him—he proceeds to the forbidding desert ahead:

"It had been constantly represented, as I have already stated, that the bay of San Francisco opened far into the interior, by some river coming down from the base of the Rocky Mountains, and upon which supposed stream the name of Rio Buenaventura had been bestowed. Our observations of the Sierra Nevada, in the long distance from the head of the Sacramento to the head of the San Joaquin, and of the valley below it, which collect all the waters of the San Francisco Bay, show that this neither is nor can be the case. No river from the interior does, or can, cross the Sierra Nevada—itself more lofty than the Rocky Mountains; and as to the Buenaventura, the mouth of which seen on the coast gave the idea and the name of the reputed great river, it is, in fact, a small stream of no consequence, not only below the Sierra Nevada, but actually below the Coast Range—taking its rise within half a degree of the ocean, running parallel to it for about two degrees, and then falling into the Pacific near Monterey [the Salinas today: see caption to the 1842 map on our page 14 above]. There is no opening from the bay of San Francisco into the interior of the continent. The two rivers which flow into it are comparatively short, and not perpendicular to the coast, but lateral to it, and having their heads toward Oregon and southern California. . . ." Surely as discoverer, interpreter, and expositor of observable fact, Frémont deserves our greatest admiration. D.G.K.

BOOKS BY MAIL
. . . *from the Academy*

First four in a California Natural History Guides series introducing the flora and fauna of the San Francisco Bay Region, profusely illustrated in color and line:

INTRODUCTION TO THE NATURAL HISTORY of the San Francisco Bay Region
by Arthur C. Smith **$1.60**
This handy, highly readable, non-technical pocket guide will be invaluable to residents and visitors alike in acquainting them with Bay Area nature.

MAMMALS
by William D. Berry and Elizabeth Berry **$1.60**
The authors, a husband-wife field naturalist team with Bill Berry one of our best animal artists, describe the Bay Area's 48 commonest animals.

REPTILES AND AMPHIBIANS
by Robert G. Stebbins **$1.60**
For those persons interested in the wide variety of reptiles and amphibians whose habitat is the Bay Area, Dr. Stebbins' text and illustrations provide a fascinating view of the world of creepers and crawlers.

NATIVE TREES
by Woodbridge Metcalf **$1.60**
Some of the finest timber and ornamental trees in North America are found in the Bay Area and their ready identification is made possible in the pages of this interesting handbook of 52 native species, their range, habitat, and importance to man.

Prices shown above *include* tax and postage.

ALL FOUR, only $6.25. Send check or money order to:

CALIFORNIA ACADEMY OF SCIENCES
Golden Gate Park, San Francisco 18, California

FROM THE READER

Pacific scoop

EDITOR, *Pacific Discovery:*

Over a hundred years ago the famous Manx naturalist Edward Forbes expressed his innermost thoughts about his work in little cartoons. One of these showed all the creatures escaping from the bag of chain mail being dragged along the bottom that was the naturalist's fishing gear of those days. Today we have much more refined contraptions for catching animals on the sea bottom, and the Russians have improved a Danish invention with a special trigger mechanism. But it is still far from perfect, as this drawing, made on the Russian research ship *Vityaz* somewhere between San Francisco and Honolulu, suggests. Dr. Filatova, who was in charge of the investigation of sea bottom animals during the recent North Pacific cruise of the *Vityaz*, is obviously of the opinion that she is not catching all she should and that some of these are still unknown to science and are successfully eluding our still imperfect instruments.

JOEL W. HEDGPETH

Pacific Marine Station,
Dillon Beach, Calif., 1 June 1959.

On the back of the drawing, which she gave to her fellow marine biologist and correspondent, Dr. Hedgpeth, Dr. Zinaida Alexievna Filatova wrote the caption: "My bottom fauna quantitative investigations . . ." (See Academically Speaking, Jan.-Feb. 1959).—ED.

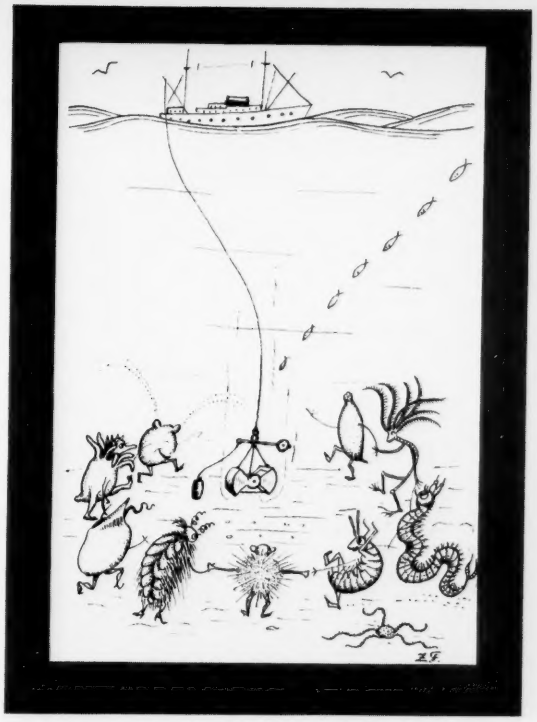
"Desert Ark"

EDITOR, *Pacific Discovery:*

In your article on "The Desert Ark" (March-April, p. 22) you had a picture of Hal Gras in the Desert Ark. What animal is the one he is holding, and what is the animal with its paws over the side of the car? Thank you.

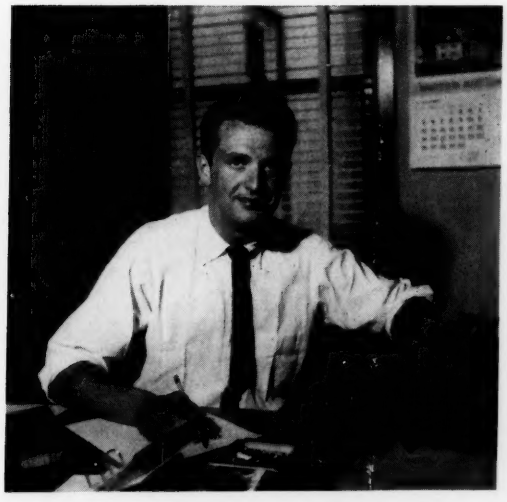
MARJORIE MAY

New York, N.Y., 7 May 1959.



Doctor Filatova's Scoop

Hal Gras' passengers were, from left to right: striped skunk; ring-tailed cat or cacomistle as it is known in the Southwest (Aztec Mexican: cacomixtle*), the one Hal is holding; raccoon; and badger, with paws over the side. Thank* you! *We should have introduced them in the caption.*—ED.



academically speaking

THE FIRST or usual sense of our ambivalent title line is somewhat strained in thinking of Gary Barrett, *PD's* advertising and circulation manager from November 1956 to April 1959. There's nothing academic about Gary. On the other hand, he fitted into the Academy scheme of things very well. Our picture shows him fitting.

Gary came to these ivyless halls from the editor's desk of the *Sausalito News*, to which in turn he had come from up Seattle way, where he graduated from the University of Washington with the Class of '53. Still reading backwards, our hero was born 28 years ago in the Douglas fir belt of that state, in Kosmos, somewhere between Portland and Seattle, where he lived a spell before migrating to the metropolitan center—until the Kosmos got too small.

At the Academy Gary's principal job was public relations, especially in connection with the Morrison Planetarium. He also ran the monthly evening meetings. And edited the monthly *News Letter*. And the *Annual Report*. In between, he met visiting firemen and took them around the premises, and to and from the airport. Oh, yes—before we forget to mention it—he edited *Pacific Discovery* for six months, gritting his teeth at the thought of the editor basking under the coconuts in the South Pacific surrounded, he was sure, by dusky damsels. Although we cannot convince him the damsels were strictly a publicity man's dream, we are eternally grateful to Gary for making that six months' Pacific tour possible, and wish him all the best in his new job as publicity and public relations manager for Dux, Inc., San Francisco, the big furniture importing and manufacturing concern. Have an easy chair, Gary!

The chair Gary vacated at the Academy is now occupied by Hal Richardson, who served as editor-writer at the University of California on the staff of former President Robert Gordon Sproul. We think he is going to fit.

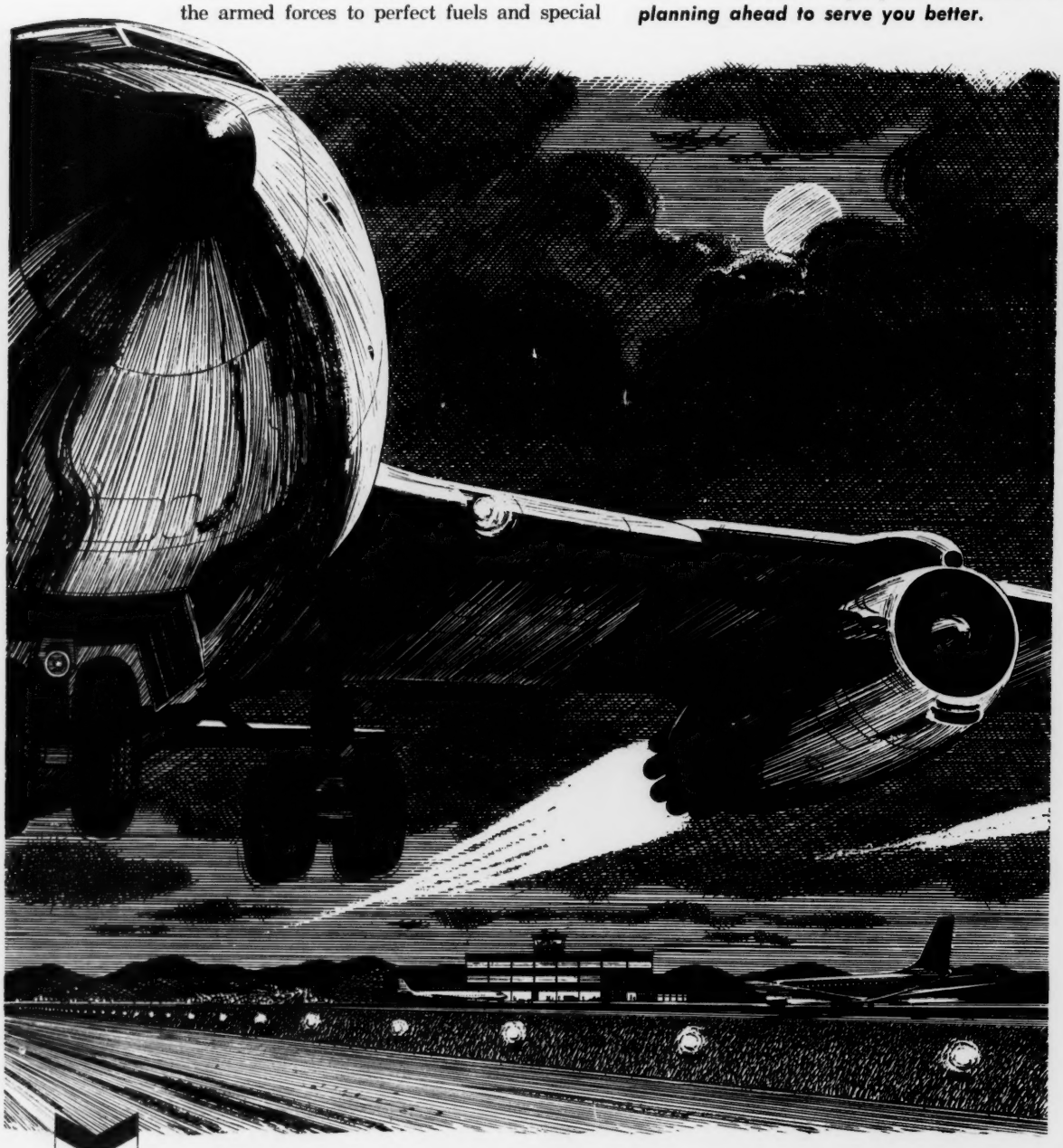
You are looking at a time machine

It sounds like science fiction: traveling across the continent in 4½ hours, going from New York to London in 6½, cutting airline schedules almost in half.

Yet these are routine for jet liners in the jet age — an era people at Standard's research laboratories have been working toward since the day seventeen years ago when we fueled the first U. S. jet flight.

Since then our scientists have worked with the armed forces to perfect fuels and special lubricants for planes that fly faster than sound, or cruise non-stop around the world. They've helped engine designers solve problems of heat and cold, in addition to aiding airlines with faster airport fueling systems.

The sum of these years of development has been to add hours to the traveler's day, days to the vacationer's week. So, in helping to harness time, as well as in putting petroleum to many other uses for you, ***the people at Standard are planning ahead to serve you better.***



STANDARD OIL COMPANY OF CALIFORNIA